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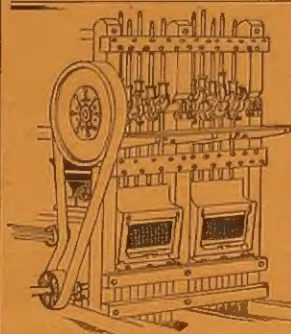
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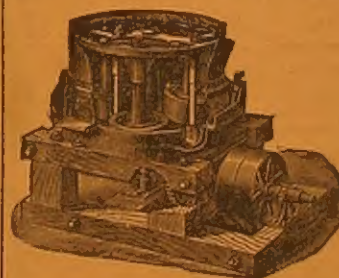
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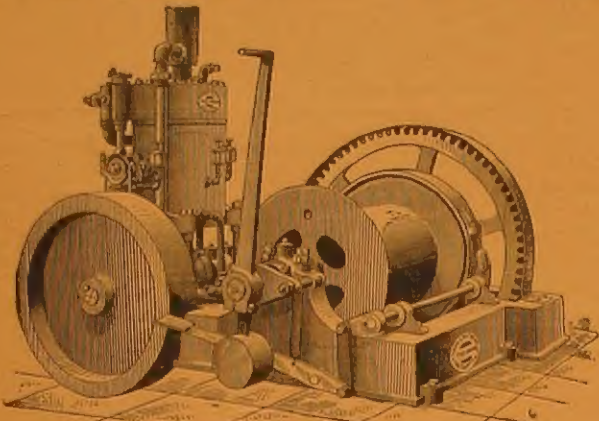
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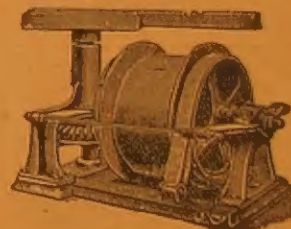
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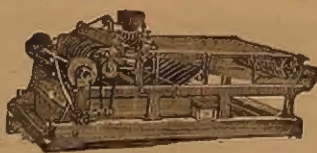
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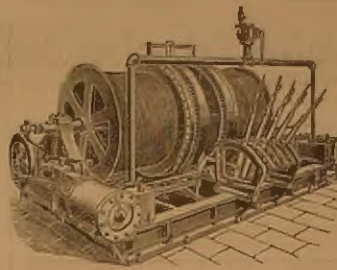
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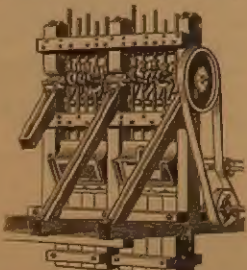
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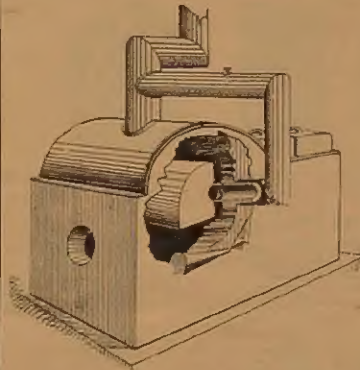
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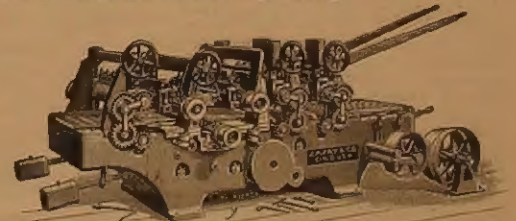
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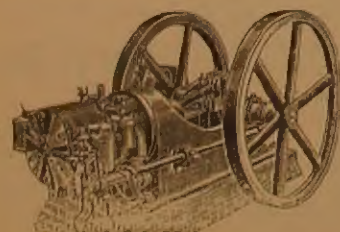
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ADVERTISING RATES FURNISHED ON APPLICATION.

"THE STEPHENS PROCESS."

The Engineering and Mining Journal, of New York, publishes an article under the above caption in their issue of October 22nd, stating therein: "the first notice of said process comes to us through THE MINING AND METALLURGICAL JOURNAL, Los Angeles, Cal." As this is the first time the JOURNAL has mentioned this well known fake process, we desire to call the attention of *The Engineering and Mining Journal* to the fact, and request that said *Journal* will please correct its error in issue of October 22nd.

There is a local paper here, called *The Los Angeles Mining Review*, which seems to act as agent for *The Engineering and Mining Journal*, and it has published a series of articles on the subject. The paper is edited by a newspaper man who has had no experience in the mining industry, and most naturally falls into the traps of the wily fakir who has a process—a secret to himself and associates only—which can successfully treat ore, containing no lead at from \$1.50 to \$2.00 per ton, no matter how refractory!

PUMPING WATER.

Less progressive advancement has been made in the pumping of water than in any branch of the mining industry, during the period since the introduction of the steam engine into the mines of Cornwall up to very recent years. During this long period the old-fashioned Cornish plunger pump has held its own against the inventors of the numerous patterns of direct acting steam pumps.

Mine water is not always an article of even or uniform composition, for it is mixed with more or less sand, mud and slimes, held in mechanical suspension, and often includes mineral acids or solutions, which act chemically on the material of which the pump is constructed. On that account the ease with which the Cornish plunger pump can be repaired is a point in its favor. While the metal parts of direct-acting steam pumps are subject to both the mechanical and chemical

action of the impurities in the mine water which tend to make the efficiency of this class of pump less with constant use.

New principles applied to the lifting or forcing of water from deep mines have been few in number, and among these may be mentioned the Pulsometer Steam Pump, which successfully pumps muddy and gritty water, and works well in northern winters with the least amount of ordinary wear to working parts, but requires a good supply of steam.

The application of forcing compressed air down a pipe and forcing the ascending column of water up another has been tried some years ago, but seems to have fallen into disuse.

IMPORTANCE OF MINING.

The mining industry has a peculiarly beneficial effect on the social progress of the country which no branch of manufacturing produces. It is a constructive branch of trade in making useful to the community that which existed in the form of ore by transforming it into the metallic state for use in other industries. The smelting and metallurgical processes required to reduce the ores, consume large amounts of fuel and chemicals to accomplish that end. It furnishes a home market for agricultural products and is therefore of great benefit in such districts, and consumes large amounts of foreign imports. The labor market is largely increased by its extension. The products of the mine, except in gold mining, give to the railroads more freight than any single industry. It consumes more lumber or timber, also more iron and steel for plants and tools than is required in the large agricultural and lumber trades.

Mining is the parent industry of the chemical, metal-working and building trades, and furnishes many products which are indispensable to the agriculturist. The diverse uses of the products of the mines and quarries are a peculiar feature of the industry and have produced a class of operators in each branch who are now regarded as specialists in their own particular line. For these and many other reasons this great wealth-producing industry requires the most liberal system of laws to expand the industry and encouragement from our municipal, State and Federal Governments.

PROPOSED NEW BOUNDARY.

There is an effort at present being made at mining association meetings, by a few parties who are in the minority on the subject, to have the best provision in our Federal mining law changed, which allows the prospector and miner to follow the dip of his vein or deposit when that departs from the vertical, under or outside of the side lines of his claim, or as it is called to do away with the extralateral right, and have in its place vertical boundaries for the side lines, the same as now bounds the end lines of the claim. They hope by this means to stop all litigation and dispute, and the question arises has such a vertical side line boundary had that effect in other countries where it has been tried? Unfortunately for the contention of these ignorant, but well meaning persons, it has not been the means of stopping law suits, or the theft of ore. The vertical side line boundary is a good rancher's or farmer's boundary, but as it limits and retards deep mining and gives the extension of a vein or deposit to others, than the miners who have proved its existence and value, it is not a just or suitable mining condition in the interests of develop-

ment and industry. Both labor and capital are defrauded by such a vertical side line boundary where the vein is not vertical, hence every effort should be made to instruct and educate these well meaning but misinformed parties on the best conditions to encourage industry in deep mining. It is our manner of settling mining disputes in courts of law among lawyers that is at fault, and our just miners side line boundary, which requires to be changed.

THE LATE POLITICAL CAMPAIGN.

We shall not discuss it on party grounds, but with reference to the money question. The subject was not made as conspicuous an issue as was expected. The republicans as a rule contented themselves with reaffirming the St. Louis platform in general terms. The populists and silver republicans declared emphatically for the free and unlimited coinage of silver at the ratio of 16 to 1, and the democrats generally indorsed their national platform adopted at Chicago in 1896. In New York, however, they said nothing about it, preferring as they started to fight the battle for control of the state upon state issues. It may be said therefore that all these parties adhere to the doctrine of silver coinage.

It is noticeable, however, that the money question was very little discussed at the hustings, and no party on platform or on the stump advocated the retirement of the greenbacks and empowering banks to supply the country with paper money. The Bankers' Alliance, however, announced their purpose to press these measures, and asserted that their cause was progressing. Doubtless, success of the measures they regarded as dependent on the triumph of the administration party.

The war and its concomitants have diverted public attention from other subjects, and the diversion will continue until the Cuban and Philippine questions are disposed of, and should Cuba and the Philippines be annexed, they will for a considerable period take up the time of the government and absorb public thought. Connected with these also will be questions of revenue, and clearing away at home the debris of the war.

The money question will not long be permitted to rest. It will come to the front again, as it is the most important of the economic questions which has not been disposed of, and the prosperity of our industries and trade will be retarded until a final settlement of the question has been effected. It will not be permitted to rest, for there is no considerable class of our people satisfied with the existing system. There is a wide divergence of opinions, some wanting one thing and some another. Yet, there is a general agreement that the controversy should be carried to a finality, even if the outcome is not what is wanted by any class, as there is some advantage in certainty, and a good deal of disadvantage in uncertainty.

We do not expect that anything at all, or of any consequence at most, will be done in the session of Congress which commences on the first Monday of December, and which becomes *functus officio* on the 4th day of the following March, for there is so much to be done which can not be postponed.

Then again, our new acquisitions will have an influence upon monetary questions, as their accession will enlarge demand, and give employment to a larger volume of silver money.

The tariff question will hardly be consid-

ered, except in unimportant details. What effect our protective duties will have upon the commercial nations of Europe, when applied to Porto Rico, Cuba and the Philippines, is a matter mainly of conjecture; it will certainly give us control of importations into them in all kinds of commodities of which we produce a surplus. It is not improbable that this will be objected to by nations which wish to compete with us for this trade.

On our side, the gold standard and greenback retirement will be strenuously urged, and, on the other, unlimited silver coinage and retention of the greenbacks. It is difficult to see any intermediate ground on which the issue can be compromised. In the meantime, and during the struggle, the coinage of the silver bullion owned by the government will go on at the rate of \$18,000,000 per annum, but it will take more than six years to exhaust the stock, if the Secretary of the Treasury and others to the minimum sum he is compelled by law to coin. Meanwhile, the business of the country must go on as best it can.

THE DEVELOPMENT OF THE CYANIDE PROCESS.

BY WM. ORR.

(Concluded from our issue of Nov. 1st.)

The sulphide in solution accounts for the fact that the solution, after having been used on the base ore, is inefficient when turned out to a thoroughly oxidized ore, even although it have had more cyanide added and the solution again brought up to the working strength. Careful attention at the mine, however, can almost entirely eliminate this danger from the base when working the oxidized ores, as this base ore occurs principally in bunches along the hanging wall, where it can be left hanging or sorted out. When the workings get deeper and the base ore becomes general, roasting will become absolutely necessary, and this is the metallurgical problem which will require to be decided in the near future, and is being investigated at the Golden Gate mill at the present time. A superabundance of talc in the oxidized ore sometimes causes trouble in leaching, but this is only a mechanical difficulty and can be obviated in most cases in the district by judicious mixing of the different characters of the ores at the mine before going to the mill to be crushed.

On some of the ore of the West Dip of the Mercur district, however, roasting of the oxidized ore will be absolutely necessary before it can be successfully treated, owing to the large percentage of talcy and clayey matter which it contains, as in the case of the La Cigale ore. This talcy and clayey ore, which is composed of hydrated silicate of magnesium, hydrated silicate of aluminum, etc., on being roasted, becomes dehydrated and in this condition leaches beautifully. The secret in treating very slimy ores successfully is to heat that ore to a sufficient temperature to expel the water of hydration (combined water of the silicates and oxides) when an easy leaching process will be produced.

The extractions obtained in the Camp Floyd or Mercur district by the McArthur-Forrest cyanide process are very good, considering the character and grade of ore. Metallurgists will agree with me when I say that an extraction of 75 to 80 per cent. on \$4 ore and 80 to 86 per cent. on \$6 ore is good work, and that is what is being done on ore in the Camp Floyd district at the present

time. I now come to a very important point, and one which will probably be of interest to all, namely, the cost of mining and milling by cyanide in the Mercur district. Mining in the Mercur district is being done at a cost of from \$1 to \$1.50 per ton and the milling from 75 cents to \$1 per ton, and several of the companies in Mercur are mining and milling by cyanide for less than \$2 per ton. This low figure for cost has enabled some of the companies to work \$3 ore at a profit, and is ample testimony to the value of the cyanide process.

In concluding, then, my remarks on the Mercur district, I will point out the daily capacity of the cyanide mills in operation at the present time, to which I will add the capacity of those in course of erection, and which will be ready for crushing within the next two months, to illustrate the great development which has taken place within the last five years.

At the beginning of 1893 the capacity of the cyanide mills in the district was fifty tons per day; at the present time it is 1,500 tons per day.

But the use of cyanide has developed equally rapidly in other States besides Utah. In the Cripple Creek camp of Colorado about 12,000 tons of ore per month of ore varying in character and value are successfully treated in custom cyanide mills. When the process was first introduced into Cripple Creek four years ago the camp was in its infancy, and the ore treated was almost entirely of an oxidized character which readily yielded its value to cyanide, but, as the camp developed, the character of the ore changed, becoming base, the values being carried in the "live" tellurium minerals and iron pyrites. This necessitated a change in the method of treatment, which was effected by first roasting the ore before leaching, thus overcoming the difficulty and enabling the process to become available for both the oxidized and base ores of the district.

Another result of cyanide research has been to prove the thorough efficiency of the process when applied, not only to ores of low grade, but to gold-bearing rock carrying values as high as four or five ounces.

In Arizona, where the cyanide process was operated in the early stages of its introduction into this country, quite a number of large ore and tailing plants are being successfully operated. In connection with the copper characteristics of the Arizona ores, it was formerly generally accepted that the presence of a small quantity of copper entirely prevented treatment by cyanide, but a modification of the process has been devised which meets the difficulty to a very large extent. In one of the Arizona tailing plants the cost of profitable treatment has been brought as low as 65 cents per ton on tailings which five years ago were considered untreatable. Considerable interest has recently been manifested by the mining operators of Montana regarding the use of cyanide, and at the present moment four new mills are either starting up operations or are in course of erection. Time will not permit me to detail the cyanide successes of California, Black Hills, Idaho, Oregon, Nevada, etc., but the extension of the use of cyanide, based largely on the results of careful experiments conducted on ores from all parts of the United States, leads to the conclusion that in many cases where the first appearance of an ore does not look favorable for treatment by cyanide, a judicious modification of the process, under expert guidance, will achieve satisfactory results. One of the greatest drawbacks, however, to an extension

of the use of cyanide is the result which occasionally follows the starting up of cyanide operations without experienced supervision. Mr. Montgomery, from Colorado, complained the other day, and justly so, of the principle prompting Eastern capital to send out their friends, who are absolutely inexperienced, to take charge of mines. Many of these Eastern representatives, who might be diffident about taking charge of a mine, have no hesitancy whatever in accepting the responsibilities attaching to the running of a mill, particularly a cyanide mill, as this process, to the uninitiated, seems to present few difficulties. With the facilities which every mine owner can now have for having his ore thoroughly tested and reported upon before incurring a nickel of expense in the erection of a cyanide plant, it is absolutely unnecessary to incur the expense of plant erection until the prospective operator knows exactly the most economical modification of the process to follow, the actual extraction to be obtained, and the cost per ton to be incurred in the obtaining of that extraction. In other words, provided the mine continues to carry the values, nothing need be left to chance in the treatment of ore by means of cyanide or potassium.

That bright, newsy little sheet, the *Spokane Miner and Electrician*, must have struck a bonanza, as it now comes out with a new colored cover, besides the usual amount of reading pages. N. G. Snow has been appointed advertising manager, while G. E. Shawler is the editor and manager.

The well known Joseph Dixon Crucible Co., of Jersey City, N. J., was established in 1827, but during all of its more than three score years and ten of busy life, no year has in any way equaled 1898 for volume of business; its plant has been running continuously, yet it is behind its orders in all departments.

"The Tripp" Metallic Packing, manufactured by Wm. B. Merrill & Co. 295 Congress St., Boston, Mass., has recently been applied to about 25 piston rods on the engine at the Osceoda and Tamarack Mines, Calumet; and they are now at work upon an order of 70 sets for the valve stems of engines at this same mine. This Packing has been in use during the past eight or ten years at the Calumet & Heckal Mine and is also in use at the Analconda, as well as a number of others. In all cases, we understand it is giving satisfaction.

The largest stock of blacksmiths' and machinists' supplies in the United States is that of S. D. Kimbark in Chicago. The business was established nearly fifty years ago, and has grown steadily until the present time. The trade of the house extends from the Atlantic to the Pacific. Mr. Kimbark, the head of the firm, is one of the oldest traveling salesmen in the United States, having visited Utah before the railroads were there, when the country was entirely controlled by the Mormons. On the books of the firm can be found the names of almost every blacksmith and wagon maker in the country. Their large six-story building, at 80, 82 and 84 Michigan avenue, Chicago, Illinois, is packed from cellar to roof with steel and other supplies, and their stock of wagon wheels, springs, axles and wagon-makers' supplies occupy more than one-half of the building. They make no attempt to handle any but the best goods in the market. Write for their handsomely bound catalogue.

MINING PROGRESS.

From *The Inland Empire* published by the Spokane *Spokesman Review* we take the following interesting matter regarding the famous lead-silver camp of Coeur d'Alene:

Lead was first discovered in the Coeur d'Alene mining district in Northern Idaho on Canyon creek in the fall of 1864, the discovery being the Tiger mine situated at the town of Burke. During the same year a few other locations were made on Canyon creek, a few at Mullan, and in the fall of 1865 the Bunker Hill and Sullivan mines were discovered at Wardner.

At the time these discoveries were made the country was inaccessible, with no railroads, wagon roads or trails, and the only way of getting in was by foot and 10 and 15 miles per day was about all the distance a prospector could cover owing to the heavy underbrush and timber.

THE LEAD BELT.

The prospector of that day who has not kept posted with the progress of the Coeur d'Alenes would hardly be able to recognize the country at this time. The lead belt at present may be divided into four districts, viz: Canyon creek, Wardner, Mullan and Nine-Mile, and standing in the importance of output in the order named. The veins in the Canyon creek districts are true fissure veins and as such are likely to go to a great depth, some of them having already reached a depth of 1,000 feet to 1,200 feet with no signs of any decrease in quality or quantity of ore.

The ore chutes in all the mines on Canyon creek are well defined, regular in width and length and lying between two walls that require but very little prospecting outside the walls or ore-bearing bodies. The chutes are much longer than usually found in other camps with like character of ore. The pay streaks vary from two to thirty feet in width, and the ore is comparatively clean, requiring no sorting of waste, that is—everything between the walls being milled. This district lies between Mullan and Nine-Mile districts, and being in the center, the ore bodies are larger and richer.

In the Wardner district the veins are not so regular and defined. The ore bodies lie between the two walls which are from 200 to 300 feet apart; between these walls the vein is filled with ledge matter, the ore bodies or pay

ore being bunchy in character and somewhat irregular as to position, requiring a large amount of prospecting work and considerable sorting of the waste from the ore when found. It would be called more of a mineral zone than a fissure vein. The ore bodies when found are large, being anywhere from two feet to 100 feet in width, but the chutes are usually short.

The Mullan district more resembles the Canyon creek veins, but the ore bodies do not carry a high value in silver. The Nine Mile district is also similar to Canyon creek with the exception that the ore chutes are not as regular or as well-defined and the ore-bodies not so wide or long.

THE FORMATION.

Generally speaking as to the formation of the camp, the country rock is slate with more or less quartzite, and is said to resemble closely the formation of the Hartz mountains in Germany, in which district lead mines have been worked for the last century, and to a depth of over 500 feet. The general character of the ore is an argentiferous galena and on an average carries about one-half an ounce of silver to one per cent. of lead.

The output of the camp for the last ten years has been steadily increasing, and in 1897 the Coeur d'Alene lead district produced nearly 40 per cent. of the entire lead product of the United States. It is upon this district that the smelters rely for their main supply of lead ores.

PERMANENCE ASSURED.

That the permanence of the camp is assured is fully evidenced by the workings of the older mines. The first mines discovered in the camp are all working today and turning out more ore than ever before in their history.

The Tiger and Poorman, the first location in the belt, has been a steady producer since 1867. The Tiger shaft is down to the 1,400 level, a perpendicular distance of 1,200 feet. The lower workings of this property are better today than they were near the surface. The Helena and Frisco in the same canyon is down a depth of 1,000 feet vertically, and with the same conditions. Judging from these two properties, which are the deepest in the camp, it is safe to say that deep mining in the Coeur d'Alenes is only in its infancy and with a long future ahead.

RECORD LAST YEAR.

For 1897, the total United States produc-



BURKE, IDAHO, POORMAN ON RIGHT, TIGER ON LEFT.

tion of lead was 196,295 tons, of which amount the Coeur d'Alene lead belt produced 69,600 tons of metallic lead, having shipped during the year 1897, 115,000 tons of concentrates which will average 50 per cent. lead and 30 ounces of silver to the ton; this output for the year 1897 being made up from the three districts—Canyon creek, Wardner and Mullan, as follows: Canyon creek, 54,565 tons; Wardner, 36,715 tons; Mullan, 23,600 tons, and furnished by the following mines:

TONS	
Canyon Creek—	
Tiger & Poorman (nine months).....	16,740
Mainmoth.....	4,360
Standard.....	22,075
Helena & Frisco (five months).....	10,750
Milwaukee.....	600
Formosa.....	40
Wardner—	
Bunker Hill & Sullivan.....	29,600
Last Chance.....	7,115
Mullan—	
Morning.....	23,660
From sundry other smaller claims (estimated).....	1,060

Total..... 116,000

Of this 116,000 tons of concentrates shipped the lead contents will average for the district 60 per cent. lead, producing 69,600 tons de-silverized lead, containing 3,480,000 ounces silver, being an average of 30 ounces to the ton of concentrates shipped.

The average price for lead for 1897 was \$3.38 per 100 pounds, and the average price of silver per ounce for 1897 was 59 cents, showing a gross value of lead, \$4,704,960, and a gross value of silver, \$2,053,200. Total value, \$6,758,160.

EVIDENCES OF PROSPERITY.

New prospects are being opened up and getting into the hands of capital able to work them, and all of the older mines are preparing for a larger output.

Nine-Mile district will be a producer within a short time. The Black Cloud company has recently erected a 100 ton concentrator, which is ready for operation.

The Custer mine is also being worked again. Considerable work has been done on the Tamarack and Chesapeake properties, also the Cowan and Blue Grouse, as well as numerous other properties on Nine-Mile, all of which make a good showing. There is every reason to expect that Nine-Mile next year will show quite a tonnage.



POORMAN MINE AND MILL.



HELENA AND FRISCO AT GEM, IDAHO.

UNEXCELLED CONCENTRATORS.

All the producing mines have concentrators of their own, which for size and close work cannot be excelled anywhere in the United States. All of them are equipped with both water and steam power, and for six months in the year are able to run by water power, effecting considerable saving in operating expenses. All are equipped with machine shops, enabling the mines to do their repair work about the mines and mills. No where do you find the business of mining conducted on better business principles than in the Coeur d'Alenes. The ore is here, the veins are permanent and while it requires considerable money to open up the properties, as well as large outlays for machinery to handle the ore, after this is done it simply becomes a business proposition to get out the ore as cheaply as possible. Every advantage is used for the economical working of the ore with as little handling of same as possible from the time the ore is taken from the mine until loaded on the cars in the shape of concentrates. Air drills are used almost altogether for the breaking of the ore in the mines, all of the mines being equipped with the best compressing plants that money can buy, some of the plants having capacities of 40 to 60 drills, and very few of less than 20 drills.

Heavy mining machinery of all kinds is used, there being two 20x60 direct acting hoists now working in the camp, situated on the Tiger and Poorman and Helena and Frisco properties. These hoists are built to go to a depth of 2,500 feet and handle from 600 to 700 tons of ore per day, besides handling the waste and necessary mining supplies, and requiring from 500 to 600 horse-power to operate them.

Pumps of a capacity of 1,000 gallons per minute, pumping 1,000 feet in one lift, are to be found in these mines. Some idea of the size of these pumps and the amount of power required to operate the same may be formed when it is considered that few cities of 20,000 have larger water-works pumps for supplying the city than these same pumps, which are used only for keeping some of the mines dry.

POWER FOR MINES.

From 1,000 to 1,500 horse-power is not uncommon for the amount of power required to operate the machinery of some of the mines of the district. And to furnish this power, water, electricity and steam are generally used. Water power costs nothing outside of

the development of the power, which first cost of installation does not generally exceed that of the first cost of steam plant for same amount of power; but expenses of operation are only nominal after flumes and water wheels are in place.

With steam the cost of furnishing power is quite an item, and with some companies requiring an expenditure of \$35,000 to \$50,000 per year.

This will be remedied within a few years by the installation of large electrical plants to be operated by water power, and which will distribute the power for the different mines in units of from 500 to 1,000 horse-power each. Such an enterprise will be a paying investment and cannot long be delayed, there being several sufficient water powers capable of furnishing this amount of power, within 40 to 50 miles of the camp. When this is installed it will materially add to the life of the mines and the permanency of the district, cheapening the cost for power and allowing low grade properties to be worked at a profit.

SHIPPING FACILITIES.

The shipping facilities of the camp can not be excelled in any mining camp in the west. There are two trans-continental railroads running to the mill doors of nearly all the producing mines of the camp. The ore is delivered direct from the mill to the cars without any team hauling, and the only improvement in this line would be a reduction on railroad freights, which the camp is entitled to, not only on account of the magnitude of the tonnage furnished, but more especially on account of the excessive freight charges in comparison with rates given other camps. Present freight rates which will average \$12 per ton to Denver and Colorado points should be reduced at least one-third. Smelter rates should also be reduced. Without the lead ores of the Coeur d'Alenes, more than one-half of the smelters now in operation would be compelled to close down, and without their lead ores, the dry ores of Colorado and Utah could not be worked.

The present condition of the Coeur d'Alenes is one of prosperity. They are furnishing steady employment to fully 2000 men in the working of the mines and mills at the best wages in the west. Fully 3000 more men derive their living indirectly from the mines and mills and depend upon their prosperity. This with the women and children will give a population of 8000 to 10000

living immediately in the vicinity of the camp that are all more or less interested in the working of the mines of this district. The payroll of the camp for wages paid out each month will amount to \$2,500,000 or 3,000,000 per annum. The railroad companies are paid for outgoing freights not less than \$1,500,000 per annum, and the smelters for the treatment of the ore nearly \$1,000,000 more per annum.

The firm of Jones and Jones, assayers of Denver, Colorado, has been succeeded by Roller & Cummins. Mr. Roller is a graduate of the Colorado school of Mines and Mr. Cummins is a practical miner and mill man as well as assayer. Messrs. Roller & Cummins have a well-equipped office and are prepared to do any work pertaining to their business.

It is very evident the Santa Fe Route has an eye for artistic printing and lithographic work. If you do not believe it send for their latest pamphlet, the California edition, "The California Limited" Santa Fe Route, season of 1898-99. It gives a condensed schedule of the time table; shows interior and exterior views of the California Limited together with a general description of same.

CLING-SURFACE FOR BELTS.

Almost the entire amount of steam and water power developed is transmitted by belting. One-third, at least, of the power is lost in its transmission. This loss amounts to many millions annually. It is tremendous, and anything likely to cut it down must be of interest.

Leather constitutes two-thirds of the belting material. It is composed of interlacing fibres, and they are commonly dry. As the belt bends over the pulley, these fibres are constantly rubbing together; the friction so produced after a time wears out some of the fibres, the leather is weakened in spots and the belt cracks. A creaking boot sole gives evidence of this. Again, the belt is stiff and hard, and as it does not conform to the pulley face it slips, its working surface becomes polished, and it slips more; then it is taken up, and, to "save time," it is taken up as short as possible! This increases the strain on the belt, the friction on the bearings, and also wears the metal; this again increases friction, and so it goes, over and over again.

This holds good, in a measure, with cotton



HUNTER CONCENTRATOR NEAR MULLEN, IDAHO.

belts. In a rope driveway the friction is between the strands, augmented by the fact that they are hard twisted.

A good rubber belt ought to cling, but the present experience is, however, that they cling for a short time only, then the belt takes on a gloss, and one begins to look about for something to make them pull.

The stitched and painted cotton belts are good drivers for a time, but soon—too soon—they also take on a polish and slip.

Repeated tests have proven that the belt that will transmit the most power is one made of "patent leather." The reasons are obvious. Such leather is thin and soft and conforms to the pulley; the surface is perfectly smooth and dry; no dust adheres to it, consequently it lies flat, with no air between it and the pulley face. It does not adhere to the pulley; and, lastly, the patent leather surface is clinging. It clings to the face of the pulley without sticking. A belt of this kind is, of course, not practical, being too delicate.

With this idea before him, the inventor of Cling Surface gathered together from as many practical sources as possible, and built up, after considerable laboratory work, a material that will produce and retain this patent leather effect and more, on a new or an old leather belt, on cotton, on rope or on a rubber belt.

When Cling Surface is applied to, for instance, a leather belt (this being the most difficult to protect and keep in order) it is melted and a very thin coating is laid on with a brush every day or two until the belt is full.

Then the fibrous leather has become filled with a neutral hydro-carbon that will not oxidize like a grease, nor evaporate like an oil; consequently it will remain in the belt, surrounding each fibre, lubricating them, the same as if they were resting in an oil bearing. Such a belt cannot crack, and it is said that it will last a lifetime.

It is as soft almost as a piece of cloth, and yet it will not stretch; the soft, spongy portions of the belt are filled and become solid and firm, yet flexible. It is absolutely waterproof. Immerse a piece in water for two years and it will not become hard. If an oily belt is treated on the inner side with it the oil will be driven out and can be wiped off, while the Cling Surface will take its place.

While this transformation is taking place in the belt, a clinging surface is being produced on its surface, as much like the patent leather surface, as it is possible to produce and retain on an oily background. This surface is

smooth and even. It is neither sticky nor smeary, and yet it is very clinging, so much so that slipping is impossible with such a belt, and it can run so exceedingly slack that, as the assistant superintendent of the Erie Railway dry dock says: "We believe we have saved the cost of taking up 500 belts in the past two and one-half years."

The illustration herewith presented illustrates one of the company's belts which had had no dressing on it for two months previous to the taking of the photo.

When a belt is full it can hold no more, so only enough is necessary thereafter to keep the surface from getting dry. Cotton belts



GEM MINE AND MILL, GEM, IDAHO. SEE PAGE 9



CLING SURFACE MFG. CO.

and ropes are treated in the same manner. As this inner treatment is not necessary with a rubber belt, the Cling-Surface must be laid on thinly, and not so often applied.

The Cling-Surface Manufacturing Co., 167 and 172 Virginia street, Buffalo, N. Y., after numerous experiments, although perfectly satisfied with the material, placed it in the hands of some fifty manufacturers for trial, to be applied to all kinds of belts, under all sorts of conditions, for a period of about twelve months before it was put on the market.

The company says the unanimous verdict was: "It is the best belt dressing we have ever used." It has been on the market now three years and the results are the same. Consequently the company guarantees that every pound of Cling-Surface will give the purchaser complete satisfaction.



STANDARD MINE AND TRAMWAY, IDAHO. SEE PAGE 9.

About Glass.

Any body who travels over the Pennsylvania railroad from Philadelphia to Chicago will be likely to notice, while passing through the Alleghany regions, many little factories situated at the foot of great quartz cliffs. These cliffs might almost be called glass cliffs, inasmuch as the composition of the rocks in question differs very slightly from that of glass. The owners of the little factories are engaged in blasting out the quartz for conversion into "glass sand" which is the raw material for glass making. The rocks thus blasted out are heated red-hot and then thrown into cold water, which splits them into small pieces. The fragments are ground in a mill, and the resulting product is shipped to the glass makers who transform it into glass by the simple process of melting it at an enormously high heat in a furnace.

This sort of stuff, however, is useful only for ordinary purposes, such as the manufacture of a low grade of bottles. To make a fine glass, a clear quartz sand must be had. Beds of such sand, nearly pure white, are found in many places, and the material is very valuable. For cut-glass and table glass oxide of lead is added to the melt. It makes the glass softer, more brilliant and more easily worked. This kind of glass is called "lead glass" or "flint glass." A single piece of glass now-a-days may cost a fortune. The price of the object lens made recently for the great telescope belonging to the Chicago University was \$70,000, and it was only forty inches in diameter.

Nobody knows how glass first came to be invented, or when it was first known notwithstanding many foolish stories to the contrary. The earliest traces of it are found among the ruins of Memphis in Egypt. In the Pyramid of Cephrenit inscribed there were "thirty treasures filled with stores of riches, and with glass which might be bended and yet not broken." Paintings on the walls of the tombs of Beni-Hassan representing the process of glass blowing, date from 2850, B. C. One of the earliest proofs of the domestic uses of glass is found in the frescoes of Thebes, where glass bottles holding wine were represented, about 1500 B. C.

Heat the Origin of Power.

All power which man uses, and all forces which he tries to curb and turn to his own purposes, have their origin in heat, whether water power, animal power, electricity or otherwise.

CORRESPONDENCE

ARIZONA.

Wolframite.

EDITOR JOURNAL:—In partial answer to many inquiries concerning the nature and uses of *wolframite*, permit me to state that the mineral so named is a compound of tungstic acid and oxide of iron or oxide of manganese or of both oxides. When clean and pure the mineral contains about 75 per cent. of tungstic acid—the valuable ingredient.

When the base consists of manganese oxide the name *hubnerite* is given to the mineral but for commercial convenience it is better not to have the two names for what in metallurgical work amounts to the same thing.

The uses of wolframite are chiefly for making an alloy of iron suitable to add to the higher grades of steel, particularly to tool-steel. It causes steel to retain its temper better, even when heated. Thus the cutting edges of machine tools are not so quickly lost as with ordinary steel when heated by the work.

The ore when pure is in considerable demand in limited quantities. The foreign supply is not as great as formerly, and the demand is increasing. The discovery of a new source of supply in Arizona is therefore specially interesting and opportune. It occurs in quartz veins in granite, near Dragoon in Cochise county. A carload has been received at the School of Mines at Tucson for crushing and concentrating.

The mineral is dark brown or black in color, and is very heavy; the specific gravity being over 7 per cent., and a cubic foot of the pure mineral thus weighs over 400 pounds.

W. M. P. BLAKE,
Territorial Geologist, Tucson, Arizona.

CALIFORNIA.

"BLAST FURNACE GAS"—AND OTHER THINGS INCIDENT THERETO.

EDITOR JOURNAL:—In your issue of Nov. 1st is an editorial article under the head of "Blast Furnace Gas," which will bear a word of correction, as well as supply a text for a much longer sermon than I presume your columns will admit of, although the subject is of paramount interest to the entire State of California, or more properly the whole Pacific coast, but more particularly to the southern portion of this commonwealth of wonderful latent possibilities. You say "When it is remembered that for each ton of pig iron smelted there are consumed about two tons of coal or coke, and there are produced in waste gas about 150,000 cubic feet, the economy, etc." For the purposes of this article permit me to assume I am somewhat familiar with the subject at bar, as the legal profession would put it.

Under modern practice the consumption of coke or anthracite coal to the long ton (2,240 lbs.) of pig iron produced ranges from about 1,650 to 2,000 lbs., other coals, except charcoal, not being used in sufficient quantity to be worthy of mention. Those furnaces consuming more than 2,000 lbs. of fuel to the ton of pig produced, are, or have been, distanced in the race for supremacy and profit and have gone, or are rapidly going out of blast—some to be reconstructed on modern lines—the majority of them to be dismantled or through neglect to fall into decay. Of those crowded

out the number exceeds 300 and their capacity being of less than 100 tons each daily. Upon the subject of gas produced, the word "waste" should be eliminated from your article so that it might read "and there is produced above 150,000 cubic feet of combustible gas for every ton of iron produced. It is a number of years since blast furnace gases have been permitted to light the surrounding country by their wasteful burning at the furnace top. Now a considerable portion is passed to the huge hot-air stoves where it is profitably consumed, and still more of it is utilized under the numerous boilers for supplying the steam necessary for power. Yet after the vast amount is thus used, there is sufficient wasted each day, for each 100 tons of iron produced, if properly utilized, to develop 2,000 horse power. I may further add the fact that these furnace gases which at times, owing to the bad working of the furnace, are so foul as to be hardly combustible under the boilers, never fails in its duty when used in the cylinder of a gas engine. Hence you well say "will have the effect of increasing the demand for large gas engines, as well as in making the district around a blast furnace an industrial center for power."

Your article suggests mention of the pertinent fact that within 175 miles of Los Angeles, not far from the line of the Santa Fé R. R., is a body of iron ore, which is not excelled anywhere in the United States either in quantity, in purity or in grade. Were this body of iron situated in the east, the north, the central west, or the south, its very foundations would be made to tremble through the mighty energy of human hands which ready capital would direct for its recovery from its massive beds that it might minister to the needs of commerce, give employment to willing labor and materially advance the industry of a great commonwealth.

Owing to the apathy of our people, or want of enterprise is perhaps the better term, the production of iron is not an issue in California. "Why," capital asks, "should we make use of the raw material with which nature has so lavishly favored us, or give employment to thousands who would add profit and prestige to the State in its raising and conversion, so long as we may import it from thousands of miles distant, clothed in a garment of \$10 or more in transcontinental carriage?"

It is but a few years since the lake Superior country was almost an unbroken wilderness. Today more than \$250,000,000 capital is invested in its iron industry alone. Where the savage trod those wilds undisturbed, now tens of thousands of men are employed in extracting, shipping and converting its iron ore, inferior in quality to that of Southern California.

During the year 1897 there was imported into the one port of San Francisco, of iron and steel and the manufactures thereof, which might have been produced in our own State, over 80,000,000 lbs. and of millions of dollars in value. During the same year there was exported from that one port by sea over 133,000 kegs of nails and another 100,000 were locally consumed, all of which, together with the large number exported from Tacoma, Seattle and Vancouver, B. C., and consumed at those points, might and should have been produced from California iron by California workmen. Japan, under her new civilization and industrial progress, is importing vast quantities of American iron, both in crude and manufactured state, from the Atlantic and Gulf States of America. The larger portion of this immense commerce by

right belongs to California, and our people would profit by it had we but the enterprise to grasp the opportunity. But we haven't—it is in other fields we reap our renown. Our fort is to send palace car and trainloads of our citizens to conventions and conclaves in the east accompanied by carloads of wines and fruits, which are dispensed with liberal hand, by which we have acquired the reputation of being not alone generous, but enterprising. While we as a people through our pilgrims have won such cheap reputation, the miners of the northwest have busied themselves in producing the ore for shipment 800 to 1,000 miles distant where the artisans of Ohio, Pennsylvania and Illinois have added strength and stability to the State, enlarged its commerce and their own bank account by its conversion. We continue to dispense refreshments, revel in cheap notoriety and permit our own rich ores of iron to slumber undisturbed by the many miners and mechanics who might so well contribute to both population and wealth of this bright land by the "Sun-down seas." Our sailing would appear to be upon smooth water, but for the timid man, and the man who hasn't investigated the subject who will tell you iron cannot be produced in this land of the "Golden West" owing to the high price of fuel. Their opinion is of just as much real value as was the testimony of the score of witnesses who cleared their friend by swearing they had not seen him steal the sheep. Without now trespassing upon your space with details, I undertake to say, and say it advisedly, that with a combination of money, brains and energy iron can be mined and reduced on this coast successfully and with profit to the above combination so employed. To the uninformed, and the timid doubters, it is only necessary to say that other doubters, a few years since, said ships could not be successfully built on this coast—behold the Oregon! the Olympia! The Scotts are not yet bankrupt. Still other doubters later said beet sugar could not be profitably produced in California. A *Spreckles* arose from the mists and this State may now boast the largest and best equipped beet sugar factory in the wide world in successful operation. If an *iron Spreckles* could but rise to the occasion, the transformation and enlargement of the industries of this State would prove something marvelous, and the mining of iron ore and its conversion from the raw state to the multitudinous forms and uses of iron and steel would pass from the realms of romance to the royal road of a magnificent prosperity.

I cannot conceive of any industry in this State but what would be bettered and advanced directly or indirectly by the development of our iron deposits. I will refer to but one which is well worth mention, not alone for its great importance, but because it escaped a place in your timely editorial. I refer to blast furnace slag cement. The gravity of this branch of the subject will be apparent when consideration is given to the many ships' cargoes of Portland cement annually imported at all our principal coast seaports, the variety and extent of its use, its material cost, and the advantage which would accrue by substituting its equivalent at a marked reduction. Blast furnace slag, not long since a waste and troublesome material, has recently been converted into a valuable by-product by the discovery that it may be made to conform almost identically in its constituents with Portland cement, and of equal value. Its manufacture has become a commercial success. Especially would it prove of great value on this coast as it could be manufactured, and

sold profitably, at half the cost which the imported commodity now commands, give employment to many men, lessen the cost of all public and private improvements wherein cement is a factor, besides most important of all greatly adding to the success of the production of pig iron in California. This State being favored with the finest Bessemer iron ores in practically inexhaustible quantity it does seem that some "Moses" with money might arise to initiate the development of so conservative, certain and profitable an industry, thereby erecting to himself a memory in the written pages of our history which would outline a monolith of marble.

C. L. HUBBS,

San Diego, Cal., Nov. 6, 1898.

Miscellaneous Mining News.

ALASKA.

Operations at the Lituga Bay Gold Placer Mining Company's properties, at Lituga Bay, have ceased for the winter. C. L. Blakemore, the superintendent, who has been carrying on the experimental operations upon the properties for the company has just returned to his San Jose California home. The company's engineer, W. S. Gardner, accompanied Mr. Blakemore as far as San Francisco, Cal., and will leave for the east on business for the company.

Douglass Island Stamp Mills.

The new stamp mills which the Treadwell and allied companies have been erecting on Douglass Island, Alaska, are completed and after being tested will be turned over to the companies by the engineers now in charge. These mills give Douglass Island a total of 880 stamps with capacity for crushing 2,500 tons of ore daily. This will be a greater amount of ore than is crushed on an equal area anywhere else in the world.

ARIZONA.

The United Verde mine at Jerome, with shafts and drifts on it 100 feet deep, was offered for sale for four years without any buyers. At last W. A. Clark of Montana, took the property and after sinking to 300 feet he had 96 feet of solid ore, and at 500 feet it is reported the ore body is 450 feet wide. Clark has refused \$20,000,000 for this mine.

The Congress mine at 150 feet was considered as a fraud by no less a personage than Diamond Joe, but at 300 feet it was a bonanza, and now at 800 feet it is held for \$3,000,000.

The Fortuna mine at 150 feet was bought by Chas. Laue for \$140,000; now at a depth of 600 feet you could not buy it for \$3,000,000.

The King of Arizona was sold for but \$30,000 when at a depth of 100 feet, while today with a depth 500 feet it is held at \$1,000,000.

The famous Copper Queen mine at Bisbee at a depth of 200 feet, was about to be sold for debt. Now at 800 feet it has sufficient ore in sight to run 50 years and money cannot buy it.

The Crowned King mine was \$23,000 in debt when down 165 feet. Now at a depth of 500 feet, debts all paid and regular dividend declared, it cannot be purchased for less than \$1,000,000.

The Pearce mine was sold for \$275,000 when a depth of 150 feet had been reached. It is now producing \$250,000 annually and is not for sale.

CALIFORNIA.

KERN COUNTY.

Work is going forward on the Yellow Aster mines in good shape. The new pump at the wells was set to work last week. The six miles of five inch pipe line is complete to within a few lengths of the mill site. The lumber is on the ground for the foundation of the 100,000 gallon water tank. A change has recently been made in the reservoir. Instead of one large wooden tank, as at the wells, several smaller iron tanks will be used, of the same or greater capacity in the aggregate.

The great rock foundation for the mill is nearly completed, and within a few days forty skilled mechanics from the Union Iron Works of San Francisco will be at work on the superstructure and the ponderous machinery of the 30 stamp mill, which by contract is to be at work by the 15th of January, '99, and will wake the echoes among these everlasting hills and the hundreds of incandescent electric lights will at nights silhouette these mountain peaks, where, but three years ago, the dismal howl of the coyote was heard and solitude reigned supreme.—*Randsburg Miner*.

A. Kratzmer of Bakersfield has gone to the Blue Chief mine to start up his five-stamp mill as soon as the conditions will permit.

SAN DIEGO COUNTY.

Mr. N. Alexander, formerly of Alamo, Lower California, is engaged working a claim with his partner, five miles northeast of Lakeside, San Diego county. They have plenty of water to run a mill and will put up one on their claim—a five-stamp mill. Quite a number of parties have located claims there, and the ore with a mill test goes \$16 per ton.

COLORADO.

Cripple Creek Dividends.

The Denver Mining Reporter publishes the following statistics:

The dividends paid so far this month are:

Portland	\$60,000
Vindicator	50,000
Moon Anchor	45,000
Strong	25,000
Elkton	20,000
Golden Cycle	15,000
Gold Coin	10,000
Modoc	10,000
Anchoria-Leland	6,000
Eldorado Leasing	1,000

Total

\$242,750

This, of course, does not include the earnings of the Independence, Strong and other great private properties or close corporations, nor the profits made by the couple of thousand leasers in the district. The dividends declared this month brings the total for 1898, up to the present date only, to cover two million dollars. The exact total is \$2,131,125, and is made up as follows:

January	\$151,000
February	283,100
March	154,025
April	201,500
May	249,000
June	146,000
July	276,750
August	268,000
September	159,000
October	242,750

Total

\$2,131,125

IDAHO.

The Warren's camp is a lively one. The Iola mine is working 35 men, and the mill is running full blast. Dividends from this property are expected early in the new year. The Riebold mine and mill are employing about 20 men. This property has in the past produced half a million in gold. The Good-enough mill is rapidly being put in shape for operations. A Boston syndicate owns this property and a great amount of development work has been done, showing up splendid ore bodies. The Keystone is working two shifts and has a fine body of rich ore in sight. The newest strike in the camp is on the Sunrise property. Some very rich ore has been taken out. The district throughout wears an air of prosperity and the coming year will witness much improvement over the past.

MICHIGAN.

The worst catastrophe that has occurred about the Calumet & Hecla works since the terrible disaster at the Red Jacket shaft some years ago when several men were killed by the falling of a cage, was the explosion of a boiler in the boiler house at the company's mills at Lake Linden. The explosion occurred without the least warning at 12:30 Friday afternoon, Oct. 28th. The accident brought instant death to John Gillies, fireman, a young man named Tremellon from Bruce Mines, Canada, and Joseph Boire, a lad who worked in the wash in the mill. John Lafarnier, who also worked in the mill, was badly scalded by the released steam and lingered in great agony till death ended his sufferings.

The Centennial company has bought forty acres of land that holds the outcrop of the Kearsarge lode. It is in the northwest corner of Section 18. The company has started a vertical shaft on their lands in the south, it being their intention to strike the lode and then follow the latter upon its incline. The shaft had been sunk about thirty feet when the new purchase was made. Another shaft following the lode from surface will be started at once.

MINNESOTA.

Twenty-three ore cargoes were shipped from Two Harbors last week, all of them large ones, and aggregating not under 100,000 tons.

While making a cut for a new railroad running parallel to Lake Superior, and about 20 miles back from the lake, graders ran into a deposit of soft ore similar to some of that on the Mesabi. Its extent is not known and its quality is poor. What may develop later is uncertain. The find is in Section 8, T. 54, R. 14, 28 miles north of Duluth, and is to be tested by a diamond drill.

The case of the independent shippers from the Minnesota ranges for a reduction in freight rates comes up again late in November, and in the meantime the case of the State of Minnesota against the Duluth & Iron Range Road for a reversal of the land grant of the latter corporation is to be heard in the United States Court in Duluth this week. The case affects 600,000 acres, all but about 100,000 of which yet remain unpatented to the road.—*Engineering and Mining Journal*.

MISSOURI.

Lead and Zinc.

The Drummer Boy at Duenweg, under the management of "Single Eye," is coming to the front as one of the big producers of that camp.

Houk & Co., on the Chitwood Hollow M. L. Co. tract, have a good prospect and are saving the dirt preparatory to putting in machinery to handle it.

The Jack Johnson on the Jackson lease is putting in machinery and buildings to operate the new prospect which is showing up big ore in sinking.

Arrangements are being made to start up the Keno in Chitwood Hollow. This has been a big producer and only needs prospecting to open a good run of ore.

The new prospect shaft east of the Bolen L. & Z. Co. mine in Newton county, has the shaft down 100 feet and has gone through some good lead ground and made a turn in this week.—*Joplin Herald*.

MONTANA.

Joseph Haines and Archie Hyndman have two promising gold prospects on Wisconsin creek, near the summit of the Tobacco Root range, in Madison county. In one of the claims the showing is fine, the assays running high. The property gives every indication of becoming a producer. John S. Allen accompanied the owners to the property a few days ago. The trip was made under adverse circumstances, the snow in some instances being four feet deep.

It was learned from reliable sources last week that the deal by which W. A. Clark has secured about 220,000 shares of stock of the Ruby has been consummated and that a cash payment of about \$20,000 has been made to bind the agreement. Mr. Clark has been figuring for some time to obtain a controlling interest in the property and has had experts making examinations with the result that the deal was closed.

The Ruby has been a famous producer for the short period it has been worked. It is located in a "pockety" country, but the pockets encountered have been phenomenally rich in gold and ruby silver. The shaft will be sunk to a depth 100 feet below the present workings and if no rich pockets are discovered at this depth sinking will be continued to a greater depth. There are immense bodies of low grade ore at the 300 foot level, but it is expected that further development work will open up some pockets of high grade ore.—*Helena Independent*.

NEVADA.

A single boulder of ore was brought into Salt Lake City containing over \$500 in silver, lead, gold and copper, that is now on exhibition at Glasgow & Western Company's offices. The boulder weighs over 500 lbs, is from the Star workings at Cherry Creek, and shows a large amount of gray copper associated with steel galena. Another carload of this ore is now on the road, the last one yielding the company about \$20,000.

The foundation has now been laid for the new Star mill, the machinery is being delivered on the ground and a wagon road between the property and plant is now being constructed. The grading for the railroad

between the company's plant at Golconda and the Adela de mine in Humboldt county has been completed and the laying of rails, which are now on the ground, will be commenced as soon as the ties that have been billed out of California arrive. The locomotive has also been delivered, and the work will be rushed through to the earliest possible completion. Meanwhile the teams are keeping the furnaces supplied with ore.

The Dexter Company, of Tuscarora, Nevada will in future handle all its ore through the mill, instead of shipping the high grade to the smelter as has been the custom heretofore. Connections with the new electric power plant will soon be made and an increased output is promised.

NEW MEXICO.

The Confidence mine is the only property upon which much activity prevails in the Mogollon district. Seventy men are employed in the mine and from fifty to sixty at the mill and in hauling ore and other employment contingent to the working of the mine and mill. The poles, to carry the power and light cables for use of electrical appliances at the mine, are now being put in place and the machinery at the mine will soon be operated by electric force and the mine lighted by electricity.

The company has a vast surplus of power generated by the great water-power system which it owns. A portion of this surplus will be utilized at the mine.—*Silver City Enterprise*.

Hillsboro Output.

Output of Hillsboro gold mines for the week ending Thursday, Oct. 27th, 1898, as reported for *The Advocate*:

	TONS
Wicks.....	25
K. K.....	20
Richmond.....	35
Snake Group.....	65
Opportunity.....	25
Sherman.....	5
Cincinnati.....	20
Tripp.....	75
Rex (silver-lead).....	10

Total..... 280

Total output since January 1, 1898—7,430.

OREGON.

George D. Young and G. H. Fisher, who own the Ruby mine, in the Saxe Creek district, will soon run a 200-foot tunnel. A milling test of the ore showed \$46 per ton in free gold.

The bridge and flume across the big Applegate, just completed by the Swain Mining and Milling Company, fell 50 feet to the bottom of the stream. The company paid \$10,000 for the mine, and has expended \$7,000 for improvements. The bridge was built to support a flume of 2200 inches. The mine had been in operation only a week. The wreck is supposed to have been caused by the use of dynamite, as one of the heavy abutments was entirely blown out. The sheriff and J. K. Carpenter, chief engineer of the company, have gone to the scene of the wreck to investigate.—*Oregon Mining Journal*.

SOUTH DAKOTA.

Central City people are feeling much encouraged over the contemplated building of a stamp mill and a cyanide plant at Gayville.

The hoist house at the Sunset shaft, at Terry, is now nearly enclosed, there being enough lumber on the ground to complete the work. There has been a long delay in getting lumber and other material on the ground. The shaft is being sunk as rapidly as two power drills can do the work.

Ground has to be staked out at the Deadwood & Delaware smelter for another large reverberatory furnace which, when completed, will be the largest ever made. The contract for the ironwork has been let to Fraser & Chalmers, of Chicago, and Marshall & Son, of Rapid City, have the contract for furnishing the brick. This will make three furnaces of this kind at the smelter.—*Black Hills Mining Review*.

The Golden Reward Company, at Harney Peak, is sinking the shaft on the Cutty-Sark mine 100 feet deeper, according to the option recently obtained. At the present writing, 125 feet has been reached in the shaft, from the bottom of which good paying ore is taken out, some of which shows considerable free gold in the rock

UTAH.

The new tanks recently added to the mill of the Daisy mine, at Mercur, are leaching their regulation quota of ore.

Work as the Eagle and Blue Bell mines at Eureka is being pushed. The miners are working in a ten-foot body of gold ore, and out of this the high grade will be sorted and shipped to the smelters and the balance reserved for future milling operations.

Four Aces, the silver-lead property of Silver City is maintaining regular shipments, and is said to be in a position to continue shipping.

Grand Central Mining Company, the owners of the gold, silver, copper and lead property at Mammoth, Utah, report the mine in splendid condition, and have proven the report by the regular dividend of \$31,250, paid on November 10th.

The regular dividend, of \$20,000, was paid October 31st, by the Mammoth Mining Co., whose properties are located at Mammoth.

The highest grade of ore ever encountered in the Camp Floyd district was recently discovered in the celebrated Mercur gold mine.

A notable sale of Silver King, of Park City, shares was made last week, 1000 shares going at \$30 per share. It is stated that a large deposit of high grade gold ore was recently encountered in the mine, something out of common, as the property has always been considered a strictly silver lead proposition. The regular dividend of \$37,500 was paid on the 10th.

WASHINGTON.

The strike of a valuable ledge in the Treasury claim, owned by Henry Kauffman and others, is the event of the week at Republic Camp. The tunnel, which is now 280 feet in length, has been in quartz for thirty feet and it has not yet finished crosscutting the ledge. The last five feet is in splendid quartz that carries high values. In this ore is found the same kind of honeycomb quartz that carries such high values in the Republic mine. In fact, the whole of the ledge matter is identical

with Republic ore. The ledge runs parallel with the Republic. The development is a most important one, as the location of the new find is significant, and goes to prove what has been maintained by mining men—that there are three great parallel ledges running through the district.

Mr. Clark, president of the Republic Company, is quoted as authority that there are 10,000 tons of ore in sight in the Republic which will average \$100 to the ton.

FOREIGN MINING NEWS

BRITISH COLUMBIA.

A compressor plant has been ordered for the Van Anda mine, Texada Island.

Among West Coast mines, which have just been heard of, are the Star group, on Tofino Inlet, Clayoquot Sound, entirely owned by a Victoria syndicate. Considerable development work has exposed a true fissure 12-foot vein of fine sulphide ore, four feet of which is a compact body of yellow metal, yielding over \$62 to the ton in all values; and the remaining 8 feet is mixed ore, averaging nearly \$20 to the ton. A contract was signed with William Miles to run an additional 50 feet of tunnel all on the valuable ore body. This when completed, will give over 150 feet of overhead stoping, and will, it is expected, block out sufficient ore to justify the erection of an aerial tramway to deep water, one and a half miles distant. A gang of men have left for the mine to proceed vigorously with the work.

—*Mining Critic.*

LOWER CALIFORNIA.

The Lower California Development Company has sent Dug Lineberger, J. Norton and Sig. Donohue to Niji, south of Tecarte, to develop the company's asbestos mine, which is reported to be very extensive.

The extensive iron mine owned by Anthony Godbe of Ensenada, situated near San Isidro, fifty miles south of Ensenada, has been examined by an expert, who made a favorable report to the owner. The mine is one of the large deposits of valuable iron ore in that section, the others being owned by General Webb and Manuel Riveroll of San Diego, California.

MEXICO.

Sonora.

In the Animas mine, not far from Querobabi. Work has been prosecuted vigorously under the able management of Professor Smith, and this week extraction of ore has commenced. The property is a high grade gold proposition and gives promise of producing very handsomely.

Sinaloa.

At San Jose de Gracia the Anglo Mexican Mining Company is taking a large quantity of gold from its mines. The Piramide Company is working only the Rosario Mine, with very good results; and the Purisima people are spending a good deal of money in development of their property, which promises very well.

Chihuahua.

The Rio Concho Mining Company will soon begin to work the rich gold placer deposits

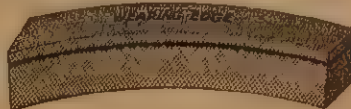
at Santo Domingo. They have 2,300 *pertenencias* denominated, and have put in already \$237,000 in machinery, pumps, roads, buildings, etc. The company will work the placers by hydraulic mining and is ready to handle 5,000 tons of earth a day, which is expected to give about 40 cents gold per ton. The works are lighted by electricity and about 250 men will be employed.—*The Trader.*

GENERAL NEWS.

We beg to call attention to an error in our issue of Oct. 15th, in Theo. F. Van Wagenen's article relative to the Basic Company's operations in Idaho. On page 11, the second paragraph of the third column should have read as follows: The consumption of nails was a shade under a pound per lineal foot of flume, and the cost a little over $4\frac{1}{2}$ ¢. The cost of flume excavation, per lineal foot, was $12\frac{1}{2}$ ¢; and of the ditch excavation, including everything necessary to permit the water to pass, $94\frac{1}{2}$ ¢.

A Tining Packing.

Those who operate pumping machinery, will appreciate any feature in packing that gives assurance of increased reliability and economy, as frequent replacements are always expensive as well as annoying. When constant service is expected the cost of shutting down is considerable. The Goodsell Packing Co., of Chicago, Ill., submit a sample of Goodsell's "98" Hydraulic Packing, which is a



GOODSELL'S "98" HYDRAULIC PACKING.

square duck packing made with a good grade of friction and further held by a seam of waxed sewing throughout the length of each coil and parallel to the wearing edge. This feature prevents separating of the plies, thus securing additional durability and efficiency of the pump. Samples will be mailed to all who desire them.

During the past summer the Joseph Dixon Crucible Company of Jersey City, N. J., have added an extension to their pencil factory, 40 by 90 ft., three stories high. The same is driven by electric power from generator placed in the main factory. No expense has been spared in the equipment of this addition in the way of up-to-date elevators, furnaces, dry-rooms etc. The Company will also put down an Artesian well, several hundred feet in depth, for a supply of water for factory use, and sometime during 1899 various other additions will be built to the Dixon Company's very extensive plant.

Lehigh University.

Lehigh University has begun the new college year with two important additions to its teaching force. The chairs of philosophy, after being vacant for some time, was filled by the election of Professor Langdon C. Stewardson, of Worcester, Mass., and he, after six months of study in Germany, has now taken up the duties of that department; while Professor John L. Stewart has come from Philadelphia to take charge of the new department of History and Economics. The coming of these two professors has greatly strengthened the classical and

literary departments of the University; but it has also served to emphasize the policy of requiring a due amount of so-called culture studies in the courses of technical education. The fact is recognized that, as at present arranged in this country, such courses are of a distinctly undergraduate character and should include a certain proportion of general studies along with those of a purely professional aim. Great interest has been shown by the students in the work of their new professors and the optional courses which they offer in addition to their required courses are largely attended. The corps of instructors remains unchanged excepting in the department of Mechanical Engineering, in which Messrs. B. H. Jones and L. O. Danse resigned at the close of last year. Their places have been filled by the election of Messrs. L. N. Sullivan, of the Sheffield Scientific School, and J. C. Peck, of the Rose Polytechnic Institute.

The University Course of Lectures by distinguished specialists in various departments of science has been continued, and the lectures thus far delivered have been by C. B. Dudley, of Altoona, Pa., on "What a chemist does on a railroad" and by Professor John L. Stewart on "Territorial expansion in the United States." Arrangements have been made for lectures in the near future by Mr. John C. Tratuwine, Jr., chief of the Water department of Philadelphia, on "The water works of Philadelphia;" by Mr. G. S. Morrison, of New York, on "Masonry;" and by Mr. R. W. Hunt, of Chicago, on "The iron manufacture in Sweden." Dr. Alexander McFarlane, non-resident lecturer on Mathematical Physics, will give his course of lectures before the students in the Electrical Engineering department at the beginning of the second term.

The equipment of the Civil Engineering department has been increased and improved during the summer, by the entire remodeling of the Testing Laboratory, by the addition of machines for torsion and compression. The pamphlet entitled "The slate regions of Pennsylvania" gives in comprehensive form the interesting results of a very complete series of tests on roofing slates. The methods of testing cement and flexure and impact will form the subject of an extended series of researches during the present year.

The interest felt by the undergraduates of the Engineering courses is shown by the activity of the Engineering Society of the University, which has begun its regular meetings for the discussion of papers on engineering subjects.

Kansas City has at last secured a good assayer in the person of F. A. Jones, E. M. The office on Missouri avenue is well equipped with everything necessary to do accurate work. Mr. Jones has had many years of experience in the business and miners can have their work done in Kansas City as promptly and satisfactorily as at any other point. V. H. Gottschalk, the assistant, has the reputation of never allowing work to leave the office until he has personally investigated it and found it to be right. Their facilities for representing ore shippers at the smelters are unexcelled.

At Butte, Montana, says a dispatch, Robert McFadden, Wm. Henderson, John Kelley and George Morgan were blown up in the bottom of the Berkeley shaft by the explosion of a missed hole. The set of holes had been fired by the night shift before it went off, and the men thought they heard all the shots. McFadden died, but the others may recover.

CONTENTS OF AIR CYLINDER IN CUBIC FEET FOR EACH FOOT IN LENGTH.

Diam. Inches	Cubic Contents	Diam. Inches	Cubic Contents	Diam. Inches	Cubic Contents	Diam. Inches	Cubic Contents	Diam. Inches	Cubic Contents
1	.0055	6	.1963	11	.6600	20	2.192	36	7.060
1 1/4	.0085	6 1/2	.2130	11 1/2	.6903	20 1/2	2.292	37	7.468
1 1/2	.0123	6 3/4	.2305	11 3/4	.7213	21	2.405	38	7.886
1 3/4	.0168	6 3/2	.2485	11 3/2	.7530	21 1/2	2.521	39	8.296
2	.0218	7	.2673	12	.7854	22	2.640	40	8.728
2 1/4	.0276	7 1/4	.2868	12 1/4	.8523	22 1/4	2.761	41	9.168
2 1/2	.0341	7 1/2	.3068	12 1/2	.9218	22 1/2	2.895	42	9.620
2 3/4	.0413	7 3/4	.3275	12 3/4	.9940	23 1/4	3.012	43	10.084
3	.0491	8	.3490	13	1.069	24	3.142	44	10.560
3 1/4	.0576	8 1/4	.3713	13 1/4	1.147	25	3.400	45	11.044
3 1/2	.0668	8 1/2	.3940	13 1/2	1.227	26	3.687	46	11.540
3 3/4	.0767	8 3/4	.4175	13 3/4	1.310	27	3.970	47	12.048
4	.0873	9	.4418	14	1.396	28	4.270	48	12.566
4 1/4	.0985	9 1/4	.4668	14 1/4	1.485	29	4.587		
4 1/2	.1105	9 1/2	.4923	14 1/2	1.576	30	4.900		
4 3/4	.1231	9 3/4	.5185	14 3/4	1.670	31	5.241		
5	.1364	10	.5455	15	1.767	32	5.585		
5 1/4	.1503	10 1/4	.5730	15 1/4	1.867	33	5.940		
5 1/2	.1650	10 1/2	.6013	15 1/2	1.969	34	6.305		
5 3/4	.1803	10 3/4	.6303	15 3/4	2.074	35	6.681		

Capacity of Air Compressors

To ascertain the capacity of an air compressor in cubic feet of free air per minute, the common practice is to multiply the area of the intake cylinder by the feet of piston travel per minute. The free air capacity of the compressor divided by the number of atmospheres will give the volume of compressed air per minute. To ascertain the number of atmospheres at any given pressure, add 15 lbs. to the gage pressure, divide this sum by 15 and the result will be the number of atmospheres.

The above method of calculation, however, is only theoretical and these results are never obtained in actual practice, even with compressors of the very best design. Allowances should be made for losses of various kinds, the principal loss being due to clearance spaces, but in machines of poor design and construction other considerable losses occur through imperfect cooling, leakages past the piston and through the discharge valves, insufficient area and improper working of intake valves, etc., etc. There are compressors where the total loss is fully 25 to 30 per cent, whereas 3 to 10 per cent. should be the maximum—according to size—in compressors of proper design and construction.

The above table will be useful for ascertaining quickly the capacity of an air compressor, also to find the cubical contents of any cylinders, receiver, etc.

The first column is the diameter of the cylinder in inches, the second shows the cubical contents, in feet, for each foot in length. To find the capacity of an air cylinder, multiply the figure in the second column by the piston travel in feet per minute; this applies to double-acting air cylinders; in the case of single acting cylinders the result should be divided by 2.

etc. The recovery of the copper and the little silver that might have dissolved will be the subject of another chapter.

The length of time for the removal of the greater part of the base metals through water lixiviation varies considerably, and it often requires between fifteen and twenty-four hours. When calcium polysulphide does not produce any precipitation, or a very slight one, it indicates that most of the base metals have been removed, and then half the water is allowed to run out and the calcium hyposulphite is allowed to take its place. However, before admitting the solution the cracks and interstices formed on the surface of the settled ore, and which are liable to offer an easy outlet for the solution, are filled up by plunging around them with a shovel.

The demarkation of the substitution of the water by the hyposulphite of calcium solution has a sweetish taste, and it requires the special attention of the foreman so as to divert, in due time, the flow to the argentiferous solution trough.

The rate of filtration is a variable one, 2 1/2-16 inches being considered a good one.

A sample of the ore after charging the vat is taken, and also a sample of the tailings, and assayed.

All the argentiferous solutions by the common trough, are carried alternately to three precipitation vats of 12x6 feet and 678 cubic feet capacity. There the silver is precipitated by a solution of polysulphide.

It often happens that by some cause part of the chloride of silver is reduced or otherwise acted upon, and becomes insoluble in the hyposulphite of calcium solution; we found that by discharging the vat and leaving the ore exposed to atmospheric effects for a certain length of time, the silver becomes soluble and could be leached again with better suc-

cess. This can be seen in the table of lixiviation.

(Operation No. 716, vat H. Operation No. 719, vat I.)

Mr. Nute, superintendent of the neighboring English mine, at present treats the old tailings, which his predecessors discarded, and which have been exposed for many years to atmospheric action, with a margin of profit.

The chlorination and lixiviation cost is \$87.87 per ton.

Hyposulphite Solution.—This solution is practically that of double hyposulphite of calcium and sodium, most of the sodium hyposulphite being converted into that of calcium by the well-known reactions of polysulphide of calcium on hyposulphite of silver.

Divers experiments carried on for a considerable length of time proved that the best strength was between 0.55 per cent and 0.60 per cent, as a stronger solution dissolved the remaining base metals of the ore, which at the precipitation vats rendered the precipitate a serious difficulty, to say nothing of the lowering of the grade of the silver sulphide.

A daily determination of the strength of the solution is a matter of a few minutes, by a standardized solution of 5.121 grams of iodine into 7 grams of potassium iodide, the reaction being the following:



Precipitation of Silver.—The precipitation of silver is done with a calcium polysulphite solution. Care must be taken to avoid an excess of the said solution, as it will cause precipitation in the leaching vats when the hyposulphite solution is decanted and used over again.

In practice they add calcium polysulphide until a few drops of it in a glass of the argentiferous solution produces a milky appearance. It is always preferable to have too little than too much calcium polysulphide in the hyposulphite solution. After stirring it with a wooden stirrer, the precipitate is left to settle, and the solution decanted by means of a rubber pipe into storage tanks, whence it is pumped by a centrifugal pump to a tank 5 feet above level of the leaching vats.

Polysulphide of calcium solution. CaS_2

	Diameter.	Height
A.....	8'	6 1/2'
B.....	6'	10'
C.....	10'	3'

The vat A is filled up to 1 foot with water and boiled with steam. Then quicklime is added and the boiling is continued for a while. Finally, sulphur is added and the boiling continued for five or six hours. The stirring is done mechanically. The proportions are as follows:

Quicklime	150
Lime	100

THE REDUCTION WORKS FOR SILVER ORES AT ADUANA, SONORA, MEX.

By MILTIADUS TH. ANMAN,
Formerly Assistant Superintendent.

(Continued from our issue of Nov. 1st.)

Leaching.—Once the vat is charged with the ore, water is admitted from below through the same discharge outlet. The main object of this is to expel the imprisoned air and have the ore more evenly settled. When the water reaches the top of the vat, then it is admitted from above, and the rubber discharge pipe is directed to the base metal solution trough. This solution contains mostly sulphates and chlorides of copper, zinc, iron,

DATA ON LIXIVIATION, DURING OCTOBER, NOVEMBER AND DECEMBER, 1892

Number of Operation	Name of Vat	Date of Charging the Vat	Date of Discharging the Vat	Initial Grade of the Ore Per Ton	Insoluble Per Ton	Tailing Per Ton	
714	A	Oct. 3	Oct. 12	46.1	1.9	1.3	
715	C	" 8	" 22	52.6	1.9	1.9	
716	H	" 8	" 26	12.3	1.9	3.2	Old Tailings.
717	B	" 9	" 18	48.7	2.6	1.9	
718	A	" 12	" 23	40.9	0.6	4.6	
719	I	" 14	" 30	14.3	2.6	3.2	Old Tailings.
720	A	Nov. 5	Nov. 20	61.1	2.6	3.2	
730	C	" 9	Dec. 9	58.6	1.3	3.9	
738	D	Dec. 1	" 17	50.7	1.3	1.9	
740	F	" 7	" 17	48.8	1.9	1.9	
743	B	" 15	" 30	49.4	1.9	2.0	
747	B	" 23	" 31	46.8	3.2	2.6	

The solution obtained after settlement is decanted into a storage tank. The residue is treated again with water and steam and then a smaller quantity of lime and sulphur are added in the proportion of $\text{CaO} = 79$. $\text{S} = 56$.

This second residue is discharged on the sand filter of vat B. When dry it is put aside and exposed to the atmospheric action. A long exposure of this residue gave us 6.2 per cent of calcium hyposulphite. Each operation gave us 6,213 liters of calcium polysulphide, at a cost of 69 cents.

Let me mention that sulphur in Aduana costs 7.4 cents per pound.

Sulphides.—Twice a week all the accumulated sulphides are thrown upon a cloth filter in a vat with a false bottom, and dried. This sulphide is calcined in a reverberatory furnace at a very low temperature, and then incorporated in the cupellation with litharge.



The average grade of the sulphide for the fourth trimester of 1897 was:

	Per cent.
Ag.....	24.1
S.....	31.0

Experiment.—An experiment to recover the sulphur from the sulphide, and gave a promising result, was the following:

11.75 pounds of sulphide treated with lime and boiled with steam for an hour gave 54 liters of calcium polysulphide solution of 2° B. with 5380 grams of sulphur per liter, and the residue was incorporated in the cupellation without any difficulty, any excess of lime in the remaining sulphide coming out of the cupel with the litharges.

Sulphur being dear in Mexico, a partial recovery of the sulphur and further experimenting to solve the problem in a way adaptable to the conditions of the country is necessary.

Cementation of the Copper in the Leaching Waters.—For a long time these solutions were discarded. Experimental work, however, proved that the free iron, which is always found in mattes of lead smelting, would easily precipitate the copper found in the solution as chloride or sulphate, besides the silver it may contain. Furthermore, the mattes were to be exported, provided they contained a sufficient amount of copper to pay the freight and duties, the real profit coming from the silver contained in them. It was decided, therefore, to enrich the mattes destined to exportation by allowing all the leaching waters to pass over them. The results were very satisfactory, I am glad to say, as mattes of 35 per cent of copper could be enriched to 40 per cent.

Concentration.—Ores of a grade between 23 and 27 ounces per ton are treated by wet crushing in a 10-stamp battery, and the pulp passes through a 30-mesh screen.

Capacity of the 10-stamp mill: 19.8 tons per twenty-four hours; 17.0 gallons of water per minute.

The crushed ore passes to a hydrometric sizer, and thence to three rubber belt Frue vanuers, each six feet in width. The one which receives the coarser stuff is corrugated, and its capacity is double the other.

The principal difficulty experienced in the concentration was the floating gray copper, which could not easily be recovered. Attempts of various kinds have been made, but with little success. The losses sustained thereby were as high as thirty per cent.

Adoption of more complex and perfect concentrating machinery could not be thought of, as the Company was not willing to undergo further expenses. To that must be

added the scarcity of water, which, towards the approach of the rainy season, becomes so great as to cause the stoppage of concentration. Only local and inexpensive means to reduce the losses could be adopted.

We first changed the screen to No. 24, in order to reduce the extreme division of galena and gray copper. This reduced the losses by 30 per cent, mainly by the recovery of galena, but the loss in gray copper, owing to its cleavage, could not be avoided entirely.

Round-buddles were resorted to, but not with perfect success. However, I have reasons to believe that were it not for other numerous occupations, and especially in the smelting department, which afforded me but little time, the round-buddle could give satisfactory results if tested thoroughly.

During the last six months of 1897, we treated: 2,389 tons of ore, containing 65,321 ounces concentrates; obtained 410,072 pounds, containing 48,768 ounces concentrates.

Cost per ton of ore treated:

Labor in crushing.....	\$0 30
Crushing.....	37
Labor at the concentration.....	51
Store expenses.....	24
Machines, pumps, etc.....	10
	\$1 52

ANALYSIS OF THE CONCENTRATES.

	Per cent.
SiO_2	12.0
Pb.....	10.1
Cu.....	12.1
S.....	22.2
Zn.....	21.0
Al_2O_3	1.2
CaO.....	0.9
Sb.....	3.2
As.....	4.1
Fe.....	2.9

Agglomeration of Concentrates.—Agglomeration of the concentrates with slag from the lead smelter, while very liquid, proved a failure.

On the other had, a preliminary roasting in a brick form was desirable, not only with a view of getting rid of some of its harmful elements, as S, As, and Sb, but also to give it solidity. To that effect experiments on various scales were made.

Agglomeration with clayish earth (a product of decomposition of rhyolite) of the following composition was made:

	Per cent
SiO_2	54.0
Al_2O_3	18.6
Fe_2O_3	15.4
CaO.....	2.2
H_2O	8.6

Fine charcoal, coming from the screening of the fuel for the smelter, was added, in the proportion of 8-10 per cent., which rendered the brick porous and afforded economy of fuel. The quantity of clay which gave the best results in the agglomeration was 13 per cent.

	Per cent
Clay.....	13
Charcoal.....	8
Concentrates.....	79
Size of the bricks.....	8" x 3" x 1"

These bricks were made by Indians and dried in the sun. Very careful and slow roasting in stall gave the required consistency and volatilization of some S, Sb and As, but the loss in silver was great.

(To be Concluded.)

PERSONAL NEWS ITEMS

W. R. SHILLING, the new superintendent of the Red River mine at Aton, California, has made numerous important improvements in the condition of affairs at the mine and the company has done well in getting him back again.

HON. S. W. DOWNEY of New York, is spending a few days in Los Angeles, Cal., on mining business.

J. A. ADAIR, prominently connected with Mariposa county, Cal., mines, has been in Los Angeles, Cal., the past week.

DR. FRANKLIN CARPENTER left the Black Hills for the East last week to take a much needed rest of two weeks or so.

MR. J. R. McDONALD, the president of the new Majestic Gold Mining Company, formerly known as the Golden Scepter, near Bonita, was in Butte, Montana, last week for a few days.

MAURICIO J. CONS is erecting a concentrating plant at Las Catalanas near Saqui Grande, Sonora, Mex. Two Frue vanuers and other necessary machinery are now en route from San Francisco, Cal.

A letter addressed to STERLING MASON, M. E., care of THE MINING AND METALLURGICAL JOURNAL remains uncalled for at the above office. Same will be returned to writer after the 1st of December.

It is said that MARCUS DALY has resigned his position as manager of the Anaconda Company and will give his attention to the Washoe Copper Co., in which he is associated with J. B. HAGGIN. MR. DALY's successor, the same authority says, will in all probability be MR. C. W. GOODALL, now with the Boston & Montana Co. at Great Falls.

C. C. WOODHOUSE, who has just made a careful examination of some properties in the Colville Reservation of Washington at Republic camp is connected with the Kamloops Mining & Development Company of British Columbia.

JAMES IRVING, the well known Los Angeles, Cal., assayer, visited Randsburg, Kern county, Cal., last week and reports that camp progressing rapidly.

A. E. ELLIOTT, of Massachusetts, who is interested in the Copper King mine and smelter at Clifton, Arizona, has been visiting the property and will endeavor to have operations thereon resumed.

GEO. B. MCAULEY, the manager of the Cariboo Consolidated Mining Co., of British Columbia, has just returned from Toronto, Canada, after having closed up the affairs of the old Cariboo Mining Co.

E. A. BROWN, long and well known at La Colorada and Minas Prietas, Sonora, Mexico, as a millman, is at Pachuca, near the City of Mexico, where he is running a 50-stamp mill.

E. M. WADK, one of the firm of WADK & WADK, assayers of Los Angeles, Cal., has just returned to Los Angeles from the desert near Ogilby. Mr. Wade is the superintendent of the cyanide mill at the American Girl, and is taking a much needed rest. The American Girl is the property of Ex-Governor Markham of California.

MR. AULT, a prominent New York mining expert, has been examining mining properties in the Cascade Mountains of Western Washington, during which time he made Spokane, Wash., his headquarters.

F. B. MORSE, who has been operating mines at Parian, Oaxaca, and other points in the Southwest of Mexico, arrived in the City of Mexico on a brief business trip.

WALTER M. BRODIE, of Batopilas, Chihuahua, Mexico, consulting engineer of the Batopilas Mining Company, was in the City of Mexico last week.

LEW E. ALBURY, E. M., of Los Angeles, Cal., has been appointed consulting mining engineer for Southern California, by the American Exploration Co. of New York, which is probably the largest corporation dealing in mines in the United States. Senator J. P. Jones of Nevada is president and W. H. Reynolds of New York secretary of the company.

MUSSES, SHUPARD & SHARING have purchased the entire stock of the Denver Engineering Works of Denver, Colorado, MR. MILLER retiring. The officers of the company now are FRANK E. SHUPARD, president and treasurer; LEWIS SHARING, vice president and general manager. The works are unusually busy on orders for mining and smelting machinery, largely for Colorado and Old Mexico.

ANTIMONY--BISMUTH

PROSPECTORS having locations of this nature and wishing to sell at once for cash, will do well to address with full particulars, P. O. Box 1078, SAN FRANCISCO, CAL.

All quotations financial reports and other statistical figures given under this head are New York Quotations, unless otherwise stated in each item. These figures are carefully revised each issue and constitute a very accurate compilation of statistical matter.

The following are the Silver, Copper and Lead quotations for the last two weeks:

	SILVER	COPPER	LEAD
October 17	60	12 50	3 80
" 18	60	12 50	3 80
" 19	60	12 50	3 80
" 20	60	12 50	3 80
" 21	60 1/2	12 50	3 75
" 22	60 1/2	12 50	3 70
" 24	60 1/2	12 50	3 65 1/2
" 25	60 1/2	12 50	3 65 1/2
" 26	60 1/2	12 50	3 60
" 27	60 1/2	12 50	3 60
" 28	60 1/2	12 50	3 65
" 29	61	12 50	3 70
" 30	61 1/2	12 50	3 70
November 1	61 1/2	12 50	3 75
" 2	61 1/2	12 50	3 75
" 3	61 1/2	12 50	3 75

Owing to the withdrawal of India from the markets the price of silver has sagged to 27s. 9-16d. There is a feeling that Spanish orders may be placed in the market, and that assists in sustaining the price, which is very sensitive. The expectation of large Spanish purchases, however, is an uncertain reliance.

There has been more activity in copper and with a brisk demand, for delivery during the balance of the year developing. Prices hardened. The closing quotations bring 12½¢ for Lake, 12½¢ and 12¼¢ for electrolytic copper in cakes, bars or ingots, and 11½¢ and 12¢ for cathodes. The price for casting copper is nominal at 11¢. Most producers appear to be entirely sold up for the balance of the

1. E. A. 52.

Lead is somewhat easier, the latest reports being to the effect that sales have been made at 3.85c. at New York, and 3.70c. at St. Louis, with sellers outnumbering buyers. With the fall business soon over, there is not much prospect of a healthy improvement in the price of lead. The foreign market has been firm, the quotations advancing rapidly from 12 1/2 d. for Spanish to 13 1/4 d., with English.

The improvement has apparently not yet reached its height in spelter. The market price has now reached the following quotations: \$4.80 and \$4.85 at St. Louis, and \$4.95 and \$5.00, New York.

Antimony continues strong, and we quote Cookson's 9¼c.; Hallett's, U. S. Star and Japanese, 9½.

Business still continues on unchanged lines and no alteration in prices can be reported. We quote for New York ton lots 33½¢ and 36¢ per lb and for smaller orders 35½¢ and 38¢.

The price, in sympathy with the advance in London, rose considerably but the event has had a tendency to keep buyers from supplying themselves as freely as they might otherwise have done, and as a result the business transacted has been small. The quotations are now \$17.00 and 17.10.

Prices are now quoted at \$15 and \$16 per oz., New York. The London quota-

tions are 59 @ 60 s per oz. Supplies are not large and prices are firm. For chemical ware, best hammered metal. In lots of 250 grams or more, 56c. per gram; in lots of 100 grams or more, 57c. per gram; less than 100 grams, 58c. per gram; unmanufactured platinum will be supplied in same quantities at 2c. less per gram.

Purified, 98@99 per cent., in cases of 120 lb. at 82c. per lb. in 5, 10, 25 and 50 lb tins at an advance

The New York quotations are unchanged at \$89.50. The London price is also unchanged at 7 lb. 5s. per flask, with 7 lb., 4s. named for second ends.

F. o. b., San Francisco: No. 1, 70 percent, nitro-glycerine per lb, in carload lots, 15½¢ less than one ton, 17½¢. No. 1* 60 percent, carload lots, 13½¢; less than one ton, 15½¢. No. 1** 60 percent, carload lots, 11½¢; less than one ton, 13½¢. No. 2, 40 percent, carload lots, 10¢; less than one ton, 12¢. No. 2*, 35 percent, carload lots, 9½¢; less than one ton, 11½¢. No. 2** 30 percent, carload lots, 9¢; less than one ton, 11¢. Black blasting powder in carload lots, minimum car, 728 kegs, \$1.50 per keg; less car lots, \$2 per keg.

There is considerable improvement in the coke situation. Dealers are feeling more cheerful over the outlook, which is much better than at any corresponding period for several years past.

Connellsville fdy coke 72-hr. fry....	\$4.85
New River....	\$4.00
Pocahontas....	3.90
Crushed.....	4.86
Gas works coke, lump, per bushel..	10

The San Francisco market in Borax is firm with a good demand.

The market is quoted as follows:

Refined, in carload lots, in barrels	7 1/2
Refined, in carload lots in sacks	7
Powdered, in car lots	7 1/2
Concentrated, in car lots	6 1/2

Quotations are given below for New York delivery:

Aluminum		
No. 1, 98 per cent. ingots, per lb		13/40c
No. 2 90 "		17/60c
Roll'd sheets, per lb.....		12c ap
Aluminum-Nickel, per lb..		13/40c
Ilsmath, per lb.	\$1	10/40c
Phosphorus, per lb		40/40c
Tungsten, per lb.....		70c
Ferro-tungsten, 60 per cent.....		70c

Variations in price depend chiefly on the size of the order.

Deliveries on contract are good. New contracts have been taken, particularly for alkali. Much 1899 business has been done in domestic caustic soda, and as low as \$1.30 f. o. b. works is reported as the contract price. Many of the domestic workers are well sold up for the remainder of 1898.

Quotations for Caustic soda domestic high test are \$1.40 @ 145 per hundred lbs.

Domestic, 58 percent., 50c. @ 55c., for-
foreign 55c. @ 60c. from dock as to style of
package.

58 per cent., 90c and 95c. per 100 lbs.
basis +8 per cent.

English, \$2.12½ @ \$2.25 per 100 lb.
American, bulk \$1.25 and \$1.50 per 100
lbs. according to brand.

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LARGEST GASOLINE PUMPING PLANT IN THE WORLD

The illustration shows the gigantic pumping plant recently built by the Hercules Gas Engine Works at the Packer Ranch, Columbia Co. 80 h. p. Hercules Engine, pumping 7300 gallons a minute, 27 feet high. Burns Gasoline or Distillate oil. Cheapest power known. Gas, Gasoline and Oil Engines, 2 to 300 h. p. Send for Catalogue. HERCULES GAS ENGINE WORKS, 916 Bay St., San Francisco.

MINING STOCK QUOTATIONS

BOSTON		
Aetna Con	Gold Coin	10 60
Allouez	Illumboldt	4 80
Anacanda	Illinois Steel	71 75
Arcadian	Lake Sup Iron	—
Arnold	Merced	8 25
Ash Hatd.	National	—
Atlantic	New Idria Mg	—
Baltic	Old Dominion	28 25
Bonanza	Quacola	55 00
Boston & Mont	Parrott	23 50
Breece	Pioneer	5 25
Butte & Boston	Quincy	119 00
Calumet & Hecla	San Isabel	5 60
Catalpa	Tamarack	173 00
Centennial	Tucumseh	3 40
Dominion Coal	Victor	8 00
Dominion Prof	Washington Ming	—
Franklin	Wolverine	28 00

NEW YORK		
Alamo	Homestake	29 50
Alce	Iron Silver	—
Annetta	Mexican	30
Best & Belcher	Mollie Gibson	—
Brunswick	Ophir	4 50
Bulwer	Pharmacist	10
Crown Point	Pymouth	—
Con. Cal. & Va.	Quicksilver	3 00
Cripple Creek Con	Quicksilver pld.	11 00
Deadwood	Serra Nevada	—
Favorito	Standard	1 60
Fortuna	Union Con	—
Golden Fleece	Yellow Jacket	—
Gould & Curry	—	—
Hale & Norcross	—	—

SAN FRANCISCO		
Alta Con	Mexican	15
Andes	Occidental	82
Belcher	Ophir	60
Best & Belcher	Overman	07
Bullion	Outerloo	3 50
Caledonia	Plymouth	03
Challenge	Potosi	23
Chollar	Quicksilver	1 25
Confidence	Quicksilver pld	4 00
Con. Cal. & Va.	Savage	18
Crown Point	Seg. Belcher	03
Deadwood	Sierra Nevada	04
Gould & Curry	Silver Hill	10
Hale & Norcross	Standard	1 75
Homestake	Union Con	18
Iron Silver	Utah	08
Justice	Yellow Jacket	15

COLORADO SPRINGS STOCKS

Acacia	02 1/2	Isabella	23
Alamo	02 1/2	Jack Pot	07 1/2
American Con	01 1/2	Little	—
Anacanda	37	Kimberly	02 1/2
Argentum Junata	20	Magnet Rock	01 1/2
Banner	—	Matos	20
Bob Lee	60 1/2	Mineral Rock	—
Creede & C	04	Mountain Beauty	01 1/2
Dante	04	Mollie Gibson	19 1/2
Dea Mines	01 1/2	Monk Anchor	97
Hikton Con	18 1/2	Mount Rosa	12
El Paso	07 1/2	New Haven	02 1/2
Emma Almee	003	Oro	003
Fanny R.	21	Trphen Bell	60
Favorito	02 1/2	Peoples	01
Findley	05 1/2	Pharmacist	32
Hitwer of the West	005	Pilgrim C	—
Franklin	003	Portland	1 18
Golden Crater	—	Pr Albert	02 1/2
Golden Fleece	22	Rattler	01 1/2
Gold & Globe	01 1/2	Specimen	05 1/2
Gold King	05	Sherran	06
Gould	03	Trachyte	02
Grav. Hill	01	Union Gold	15 1/2
Hayden	004	Work	05 1/2
Ingham Con	04 1/2	—	—

SALT LAKE CITY

Aliso	75	Little Pittsburg	03 1/2
Ajax	88	Malvern	—
Alliance	10	Mammoth	2 10
Anchor	80	Maxfield	—
Buckeye	32	Mercur	0 07 1/2
Bullion Rock	5 50	Morgau	—
Cent. Eureka	28 00	Northern Light	08 1/2
Chloride Point	—	Omaha	52
Daisy	50	Ottario	6 25
Dalton	005	Overland	1 85
Dalton & Lark	04	Richmond Ana	—
Daly	000	conda	04 1/2
Daly West	4 00	Rover	—
Dexter	2 35	Sacramento	53
Eagle	07 1/2	Silver King	29 50
Eagle & Blue Bell	10	Blous Con	—
Four Aces	29	Subsides	05 1/2
Galena	44	Sunshine	45
Gemini	—	Swansea	2 82
Geyser-Marion	54	Sw Swanses	1 23
Grand Central	8 87 1/2	Utah	34 1/2
Homestake	—	Utah	50
Horn Silver	15	Young America	50

ROSSLAND, BRITISH COLUMBIA.

Alecta	10	Jumbo	31
Big Three	10	Knight Templar	05
Butte	01 1/2	Kontenay London	10
Caledonia Con	05	Le Roi	10
California	15	Lilly May	14 1/2
Camp Bird	05	Madal	08
Colli Queen	05	Mayflower	08
Centre Star	—	Monita	14
Colonna	32	Monte Christo	34
Commander	10 1/2	Morning Star	08
Deer Park	05 1/2	Moorman	05
Della Colla	02	Nest Egg	03 1/2
Delaware	12	Northern Belle	03 1/2
Eastern Star	20	Novelty	03 1/2
Enterprise	18	O. K	10
Eruc	03 1/2	Palo Alto	02
Eureka Con	05 1/2	Phoenix	08
Evening Star	02 1/2	Rossland	13 1/2
Georgia	12 1/2	St. K. Lee	08
Gertrude	05	Red Bag	08
Golden Drip	15	Red Mount View	07
Good Hope	02 1/2	Red Point	05
Grand Prize	02 1/2	Rossland Mines	10
Great Western	09 1/2	Rossland Red Mt	05
Hattie Brown	03	St. Elmo	05
Hecla	04	St. Paul	12 1/2
High Ore	04	Silver Bell	02 1/2
Imperial	10	Silverline	05
Iron Horse	07	So Cross & W. Con	10
Iron Mask	10	Virgil	1 02
I. X. L.	10	War Eagle Con	3 75
Josie Mac	30	West Le Roi	20
Joule	30	White Bear	09

DENVER STOCK REPORT.

Aetna	001	Keystone	04 1/2
Anchora Leland	87	Lillie	08
Anacanda	27	Matra	22 1/2
Arcadia	01 1/2	Mollie Gibson	20
Argentum Junata	20	Moop Anchor	87 1/2
Banner	—	St. Rosa	12
Bob Lee	01	Old Gold	—
Bulion	08 1/2	Peoples	01
El Paso G	07 1/2	Pilgrim C	02
Enterprise	04 1/2	Pine Creek	003
Fanny R	21	Portland	1 18
Garfield Group	—	Prince Albert	01 1/2
Geo. Washington	062	Republic	02 1/2
Golden Eagle	18	Sacramento	02 1/2
Gold Coin	05	Smuggler	24
Gilpin & C	40	Specimen	03 1/2
Gilpin Four	04 1/2	Tamarack	007
Golden Fleece	22	Union Gold	15 1/2
Isabella	23	Virginia M	03 1/2

Iron Clad 02 1/2 Wheel of Fortune 002 1/2
Jack Pot 03 1/2 Work 02 1/2

MEXICO

Name of Company	State	Price
Alamosa	Hidalgo	6
Amatitlan y Concordia	Guanajuato	24
Angustia	Guanajuato	240
Arevalo y Anexas	Hidalgo	390
Asturiana y Anexas	Zacatecas	170
Barrados y Cabras	Durango	150
Cartelone de Medina	Hidalgo	100
Caleton y An	Zacatecas	100
Candelaria de Pinos	Zacatecas	80
Capusaya	Durango	120
Carmen	Hidalgo	490
Castellana y San Ram	Tepe	25
Cerro Colorado	Chihuahua	10
Cinco Senores y An	Guanajuato	450
Concepcion y Anexas	San Luis Potosi	100
El Oro	Guanajuato	40
Papapanza y An	Mexico	1,300
Gundulup	Guanajuato	180
Huautla	San Luis Potosi	100
Las de Borda	Mexico	100
Luz de Maravilla	Hidalgo	100
Pabellon	Hidalgo	150
Palma	Zacatecas	100
Paralima de los Com	Hidalgo	400
Refugio y Va	Hidalgo	1
Restauradora	Durango	30
San Francisco	Hidalgo	270
S. Ped. Chalchihuites	Hidalgo	12
San Rafael y Anexas	Hidalgo	325
do. Free Stock	Hidalgo	490
San Rafael del Oro	San Luis Potosi	70
Sta. Maria de la Paz	Durango	50
Soledad	Hidalgo	500
Sorpres	Hidalgo	250
Trinidad	Guanajuato	40
Tlaningo	Puebla	27
Union	Hidalgo	330
Zomelhuacan (gold)	Vera Cruz	180
Zona Min de Posos	Guanajuato	16

Notes—The above Mexican stocks are figured on the basis of Mexican silver

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(Stock Transfer Office, Colorado Springs.)

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Gentlemen:—We bought two years ago one of the largest size of the straight line type of Ingersoll-Sergeant Piston Inlet Compressor.

This was found to be too small for our needs about a year ago and we purchased of you a Duplex Corliss machine 16" x 18 1/2" x 42".

This was set in place in our shaft house in the Cripple Creek District, 10,000 feet above the level of the sea, and has been running continuously ever since, and at times over ten 15' Belts drill. The steam cylinders were connected to an independent jet Condenser, for which we are using the mine water, and the resultant economy of operation is very noticeable.

The operation of this Compressor is as near perfect as that of any machine we have ever seen, and this type is well worth the extra cost on account of the great permanent economy in operation.

Our mine is equipped exclusively with your drills and we have only the highest words of praise to give them.

Yours very truly, The Portland Gold Mining Co.,

Jas. A. Burns, President

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INCORPORATED MINES PAYING DIVIDENDS.

NUMBERS	NAMES OF MINES	LOCATION	No. of Shares	Capital Stock	Par Value	Amount of Last Dividend	Date of Last Dividend	Total Amount Paid in Dividends	Kind of Minerals Produced
1	Aetna Cons.	California	100,000	\$ 500,000	\$ 5	\$ 10	Oct 1898	\$ 150,000	Q
2	Alaska Treadwell	Alaska	200,000	5,000,000	25	37½	July 1898	3,550,000	G
3	Alaska Mexican	Alaska	200,000	1,000,000	5	10	July 1898	295,031	G
4	Alce	Montana	400,000	10,000,000	25	0½	April 1898	1,075,000	G, S
5	Alce	Utah	400,000	10,000,000	25	0½	Sept 1898	250,000	S, L, G
6	Anaconda	Montana	1,200,000	30,000,000	25	1 25	May 1898	6,750,000	C
7	Anchorage Leland	Colorado	600,000	600,000	1	01	Oct 1898	162,600	G
8	American Gold	Colorado	300,000	3,000,000	10	05	Sept 1898	336,000	G, S, L
9	Atlantic	Michigan	40,000	1,000,000	25	1 00	Feb. 1898	700,000	S
10	Bald Butte	Montana	250,000	250,000	1	03	Sept 1897	712,500	G, C, S
11	Big Six	Colorado	500,000	500,000	1	00½	May 1898	15,000	G, S
12	Boston & Montana	Montana	150,000	3,750,000	25	5 00	Aug 1898	8,375,000	G, C, S
13	Bullion Beck and Champion	Utah	100,000	1,000,000	10	10	Oct 1898	2,535,000	G, S
14	Bunker Hill and Sullivan	Idaho	300,000	3,000,000	10	07	Sept 1898	437,000	S, L
15	Cariboo	British Col	800,000	800,000	1	02	July 1898	220,000	G
16	Calumet & Hecla	Michigan	10,000	2,500,000	25	10 00	Sept 1898	54,850,000	C
17	Cedennial Eureka	Utah	30,000	1,500,000	50	1 00	Mar 1897	2,010,000	S, L
18	Central Lead	Missouri	10,000	1,000,000	100	1 00	Sept 1898	66,980	L
19	Champion	California	34,000	340,000	10	25	April 1898	290,200	G
20	Charleston	S. Carolina	10,000	1,000,000	100	1 50	Sept 1898	165,000	G
21	Chloride Point	Utah	500,000	500,000	1	01	Dec 1897	5,000	G, S
22	Colorado Smelting	Montana	100,000	1,000,000	10	50	July 1898	1,595,000	G, S, C
23	Crescent	Utah	24,000	600,000	25	July 1897	280,000	G
24	Crowned King	Arizona	600,000	6,000,000	10	02	Aug 1898	181,000	G, S, L
25	Day	Utah	150,000	3,000,000	20	25	Mar 1897	2,925,000	S, L
26	Deadwood Terra	S. Dakota	200,000	5,000,000	25	05	May 1898	1,750,000	G
27	De Lamar	Idaho	400,000	2,000,000	5	29	May 1898	2,551,600	S, L
28	Elkton Consolidated	Colorado	1,250,000	1,250,000	1	01½	Oct 1898	636,911	G, S
29	El Paso	Colorado	650,000	650,000	1	01	Jan 1898	12,053	G, S
30	Empire State	Idaho	75,000	750,000	10	10	Aug 1898	15,000	G
31	Fern	British Col.	200,000	200,000	1	05	Jan 1898	10,000	G
32	Florence	Montana	500,000	2,500,000	5	01	May 1897	132,530	S
33	Geyser-Marion	Utah	300,000	1,500,000	5	02	Sept 1898	96,000	G
34	Gold Co. of Victor	Colorado	1,000,000	1,000,000	1	01	Oct 1898	120,600	G
35	Golden Cycle	Colorado	20,000	1,000,000	5	00½	Aug 1898	155,000	G
36	Gold Co.	Colorado	200,000	1,000,000	5	05	Nov 1897	160,000	G, S
37	Gold and Globe	Colorado	750,000	750,000	1	3-10	July 1897	51,625	G
38	Golden Reward	S. Dakota	1,000,000	1,000,000	15	15	Feb 1898	155,000	G
39	Grand Central	Utah	250,000	250,000	1	12½	Oct 1898	156,000	G, S, C, L
40	Hecla Consolidated	Montana	30,000	1,500,000	50	50	Feb 1897	2,175,000	S, G, L, C
41	Highland	S. Dakota	100,000	10,000,000	100	20	Sept 1898	3,724,718	G
42	Holy Terror	S. Dakota	300,000	300,000	1	08	Aug 1898	108,000	G
43	Homestake	S. Dakota	125,000	12,500,000	100	50	Sept 1898	6,991,750	G
44	Hope	Montana	100,000	1,000,000	10	10	Mar 1898	762,252	S
45	Horn Silver	Utah	400,000	10,000,000	25	05	Sept 1898	5,210,000	S, L
46	Idaho	British Col.	500,000	500,000	1	05	May 1898	264,000	G
47	Iowa	Colorado	1,000,000	1,000,000	1	00½	June 1898	90,000	G
48	Iron Mountain	Montana	500,000	5,000,000	10	1 00	Jan 1898	501,100	S
49	Isabella	Colorado	2,250,000	2,250,000	1	00½	June 1897	270,000	G
50	Kearns	Michigan	40,000	1,000,000	25	10	Aug 1897	160,000	C
51	Kennedy	California	101,000	10,000,000	100	48	Aug 1898	1,790,000	G
52	Last Chance	British Col.	500,000	500,000	1	04	Jan 1897	42,000	S, L
53	Le Roi	British Col.	500,000	2,500,000	5	10	Apr 1898	775,000	G
54	Lilhe	Colorado	1,000,000	1,000,000	1	01	Sept 1898	134,110	G
55	Minnesota	Minnesota	165,000	16,500,000	100	1 50	Oct 1898	4,750,000	G
56	Modor	Colorado	500,000	500,000	1	02	Nov 1898	75,000	G
57	Montana Ltd	Montana	880,000	8,800,000	5	05½	May 1898	2,997,557	G, S
58	Montana Ore Purchasing	Montana	40,000	1,000,000	25	1 00	July 1898	780,000	G
59	Morning Star	California	2,400	240,000	100	5 00	June 1898	666,600	G
60	Mt. Rosa	Colorado	1,000,000	1,000,000	1	02	Jan 1898	60,000	G
61	Mercur	Utah	200,000	5,000,000	25	12½	Oct 1898	1,191,000	G
62	Mammoth	Utah	400,000	10,000,000	25	05	Sept 1898	1,310,000	G, S, C, L
63	Moon Anchor Gold	Colorado	600,000	600,000	1	07½	Nov 1898	281,000	G
64	New York & Hon. Rosario	Central A	150,000	1,500,000	10	10	July 1898	930,000	S, G
65	Napa	California	100,000	700,000	7	20	Oct 1898	950,000	Q
66	New Idria Quicksilver	California	100,000	500,000	5	20	Sept 1898	80,000	Q
67	Ontario	Utah	150,000	15,000,000	100	75	Dec. 1897	13,542,500	S, L
68	Osceola	Michigan	50,000	1,250,000	25	1 00	June 1898	2,272,500	C
69	Parrot	Montana	230,000	2,300,000	10	30	July 1898	2,000,898	G
70	Pennsylvania Consolidated	California	51,500	5,150,000	10	05	Aug 1898	43,925	G
71	Pioneer	California	100,000	1,000,000	10	12½	Aug 1898	37,500	G
72	Portland	Colorado	3,000,000	3,000,000	1	03	Oct 1898	2,237,080	G, S
73	Princess	Colorado	1,000,000	1,000,000	1	00½	Feb 1897	45,000	G
74	Quincy	Idaho	100,000	2,500,000	25	8 50	Aug 1898	10,120,000	C
75	Rambler-Cariboo	British Col.	1,000,000	1,000,000	1	02	April 1897	40,000	G
76	Raven	Colorado	1,500,000	1,500,000	1	01	March 1898	20,000	G
77	Reco	British Col.	1,000,000	1,000,000	1	10	Jan 1898	247,500	S, L
78	Republic	Washington	1,000,000	1,000,000	1	01	Oct 1898	30,000	G
79	Sacramento	Utah	1,000,000	5,000,000	5	00½	Oct 1898	61,000	G
80	Santa Rosa	California	100,000	100,000	1	10	Feb 1898	125,000	G, S
81	Small Hope Consolidated	Colorado	250,000	5,000,000	20	10	June 1898	3,300,000	S
82	South Swansea	Utah	150,000	150,000	1	05	Oct 1898	125,000	S, L
83	Standard	California	200,000	20,000,000	100	10	Aug 1898	5,671,940	G, S
84	St. Joseph	Missouri	5,000	2,000,000	10	1 50	Sept 1898	2,747,000	L
85	Silver King	Utah	150,000	8,000,000	20	25	Oct 1898	1,725,000	S, L, G
86	Stocan Star	British Col.	2,000,000	1,000,000	0.50	05	Mar 1897	350,000	G
87	Smuggler	Colorado	1,000,000	1,000,000	1	01	June 1898	1,035,000	S, L, Z
88	Sonsora	Utah	10,000	500,000	5	05	Oct 1898	121,500	S, L
89	Tom Boy	Colorado	200,000	2,000,000	10	10	Dec 1898	800,000	G
90	Tamarack	Michigan	60,000	1,500,000	15	3 00	June 1898	5,330,000	C
91	Victor	Colorado	200,000	1,000,000	5	10	Sept 1898	1,015,000	G
92	Vindicator	Colorado	1,500,000	1,500,000	1	05	Oct 1898	187,500	G
93	Western Mine Enterprise	Montana	500,000	500,000	1	20	Jan 1898	48,000	G
94	War Eagle	British Col.	2,000,000	2,000,000	1	01½	Sept 1898	240,000	G
95	Wolverine	Michigan	40,000	1,500,000	25	1 00	Oct 1898	60,000	C
96	White Water	British Col.	125,000	625,000	5	32	April 1898	194,000	G
97	Yellow Aster	California	100,000	1,000,000	10	03½	Aug 1898	118,789	G

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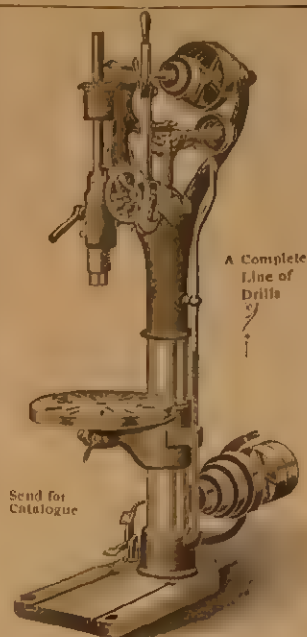
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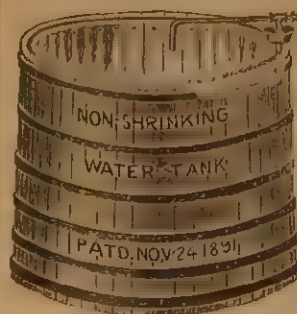
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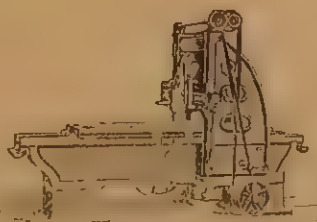
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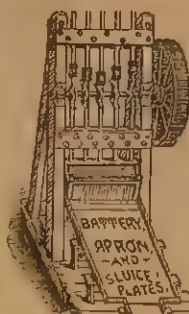
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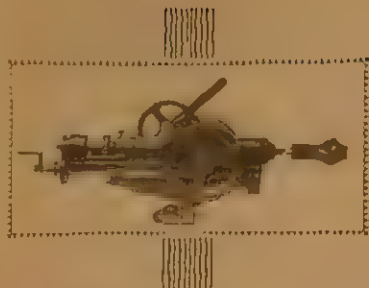
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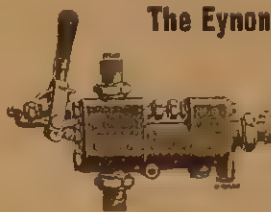
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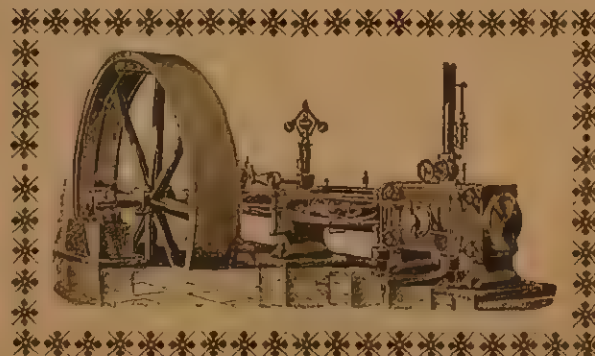
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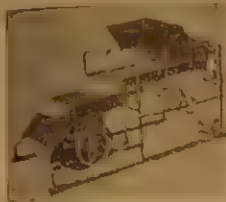
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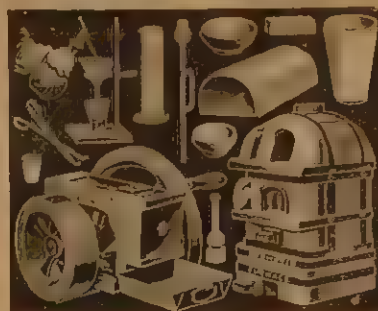
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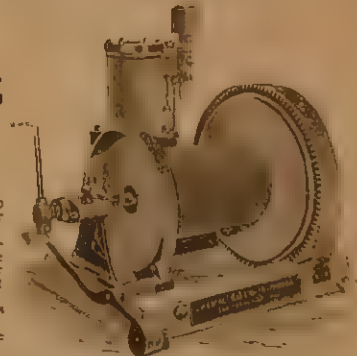
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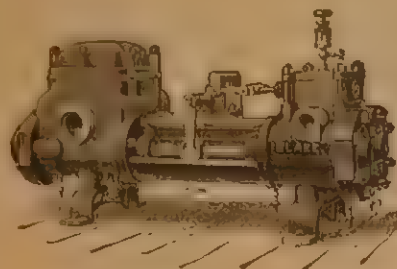
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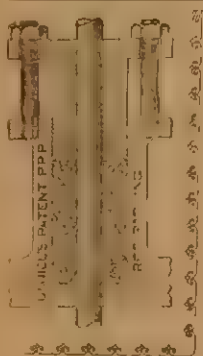
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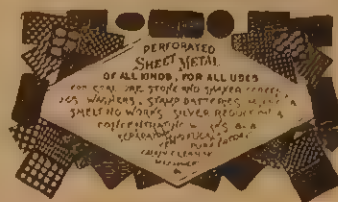
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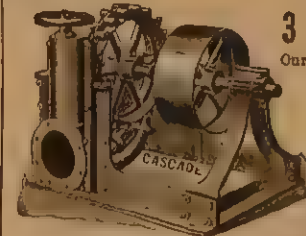
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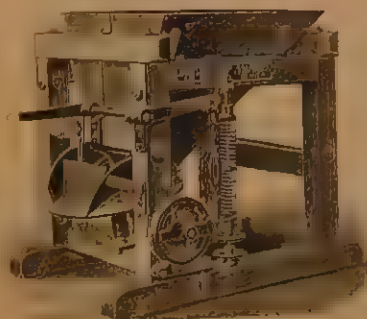
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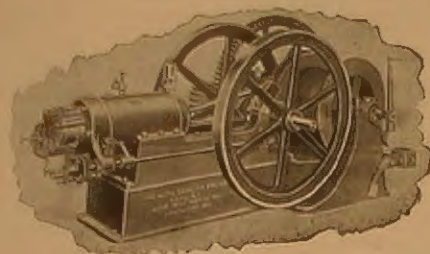
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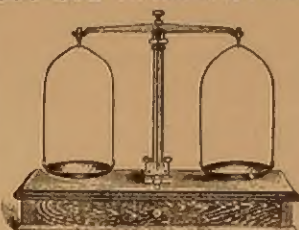
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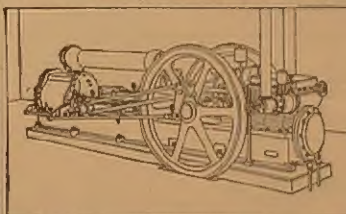
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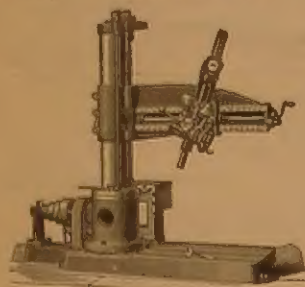
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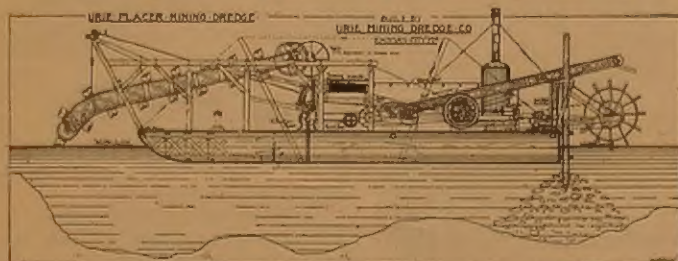
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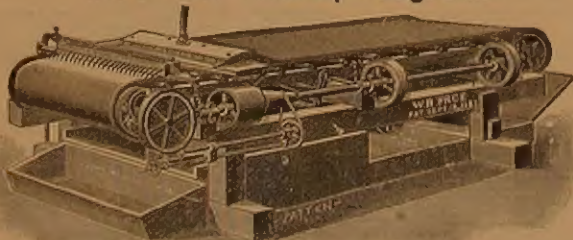
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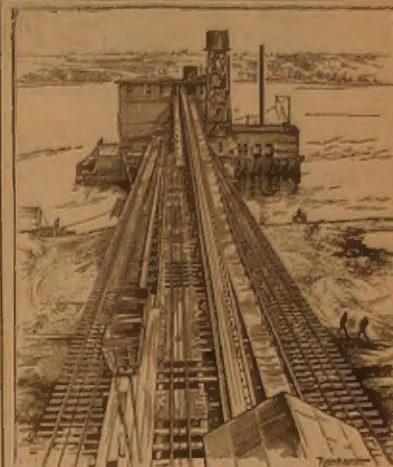
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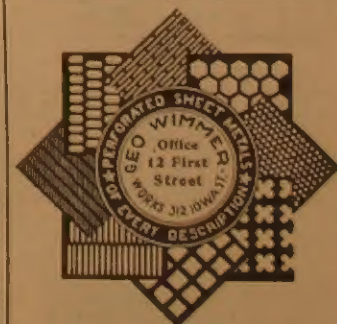
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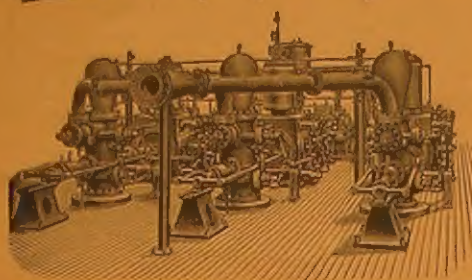
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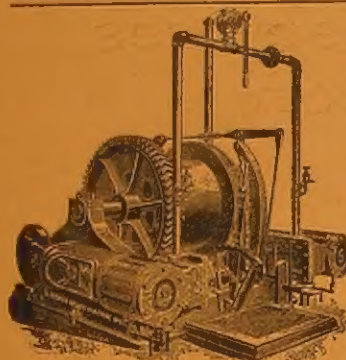
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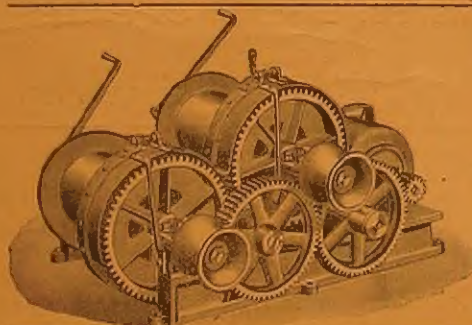
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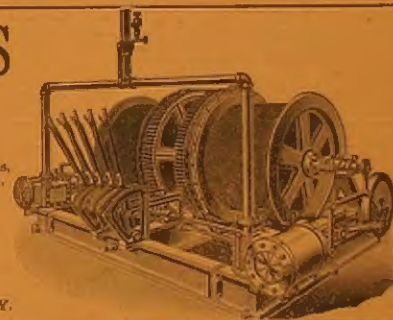
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